

DOCUMENT A00801

SPECIAL PROVISIONS**MIDDLEBOROUGH**
Bridge Preservation, M-18-017 (463), I-495 over Route 105
& MBTA/MACRR

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

The work under this contract consists of a bridge preservation at Bridge No. M-18-017 (463) and consists of furnishing all necessary labor, materials, and equipment required to perform the work described below, as well as all other related work incidental to a project of this nature.

The work under this project includes the following:

- Replacing the existing joint seals at the Northern, Southern, Eastern, and Western piers with new pre-compressed seals.
- Replacing the existing joint seals at the median portions of the Eastern and Western piers and Beam 26 locations with new hot pour sealer.
- Perform beam end repairs by encasing steel beams as shown on the contract drawings.
- Replacing existing protective course at abutment approach slabs.
- Constructing and extending the approach slabs through median with an asphalt and coarse aggregate apron at the Eastern and Western abutments
- Cleaning abutment seats and pier caps in preparation for concrete repairs.
- Perform substructure concrete repairs as shown on the contract drawings.
- Perform slope paving repairs at the Eastern abutment as shown on the contract drawings.
- Installing weepholes in the existing Eastern abutment backwall.
- Sealing the bridge deck using high molecular weight Methacrylate.
- Providing related traffic control as shown in the contract documents.
- Clean (full removal) and paint steel bridge No. M-18-17(463) including bearings.

Under this project various artisans, such as cement masons, carpenters, and laborers, as specified in Item 100.1 "Base Labor Rate", materials, and equipment, shall perform scheduled repairs for non-itemized related work.

If the work requested by the Engineer is not in the list of bid items, then the Contractor will be reimbursed under Non-Bid Items.

All work shall be performed within, and accessed by, existing State, City or Town roadway layouts. No rights to enter on, or occupy, private property have been acquired for this project.

SCOPE OF WORK (Continued)

All work under this Contract shall be done in conformance with the *2023 Standard Specifications for Highways and Bridges*, the *Supplemental Specifications* contained in this book, the *2017 Construction Standard Details*, the *Traffic Management Plans and Detail Drawings*, *MassDOT Work Zone Safety Temporary Traffic Control*, the *1990 Standard Drawings for Signs and Supports*; the *2015 Overhead Signal Structure and Foundation Standard Drawings*, the *2009 Manual on Uniform Traffic Control Devices (MUTCD)* with Massachusetts Amendments; the *1968 Standard Drawings for Traffic Signals and Highway Lighting*; *The American Standard for Nursery Stock*; the Plans and these Special Provisions.

SUBSECTION 7.05 INSURANCE REQUIREMENTS**B. Public Liability Insurance**

The insurance requirements set forth in this subsection are in addition to the requirements of the Standard Specifications and supersede all other requirements.

Paragraphs 1 and 2

The Massachusetts Department of Transportation and applicable railroads shall be named as additional insureds.

INSURANCE REQUIREMENTS

The insurance requirements set forth in this section are in addition to the requirements of the Standard Specifications.

Railroad Operations Directorate: Section F:

The Contractor shall furnish, with respect to the operations of the Contractor or any of the Contractor's Subcontractors performing within the Railroad right-of-way, broad form Railroad Protective Liability Insurance covering all work performed under this Contract in the amount of not less than \$5,000,000 per occurrence, \$10,000,000 aggregate combined bodily injury and property damage. The Contractor shall carry Worker's Compensation Insurance, including Employers Liability Insurance as provided by Massachusetts General Laws, Chapter 152, as amended, covering all work performed by him under the Contract. The Contractor shall carry Umbrella Liability Coverage with limits of not less than \$10,000,000 per occurrence, covering all work performed by him under this Contract. Automobile Liability Insurance: The Contractor shall provide Automobile Liability Insurance to include the use of all vehicles; owned, leased, hired and non-owned, with limits not less than \$1,000,000 combined single limit covering all work performed under the Contract.

INSURANCE REQUIREMENTS (Continued)

2. Such insurance shall be written on an occurrence basis.
3. The MBTA and applicable railroads shall be the named insureds on such insurance. Additional named insured are listed below. Original policies and certificates shall be made out to the MBTA and applicable railroads and mailed to:

MBTA: Treasurer-Controller
 Massachusetts Bay Transportation Authority
 10 Park Plaza
 Boston, MA 02116
 Tel. (617) 222-3064

Keolis: General Counsel
 Keolis Commuter Services, LLC
 470 Atlantic Avenue
 Boston, MA 02210

4. The Contractor shall furnish to the MBTA and railroad companies a signed original of the Railroad Protective Liability Policy prior to entry upon the railroad right-of-way.
5. Such policies shall provide 30 days' notice to each named insured by the insurance company before any change or cancellation of the policies.
6. Such Railroad Protective Insurance policies may be provided in forms commonly referred to as AAR/AASHTO or ISO/RIMA but not Oregon.

Questions regarding insurance should be directed to the MBTA's Risk Manager at 617-222-3064.

The contractor shall be aware of the latest MBTA insurance limits / requirements. See the following link for more information:

<https://www.mbtarealty.com/licenses.html>

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 3:00 P.M. on the Tuesday of the previous week before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdotsspecifications@dot.state.ma.us The MassDOT project file number and municipality is to be placed in the subject line.

SUPPLEMENTAL REQUIREMENTS FOR NON-BID ITEMS

(Supplementing Subsection 3.04)

The Contractor will be paid for additional artisans, equipment rental, materials, and engineering services required to perform the work plus (10%) percent, plus actual increased bond premium.

The Contractor shall be required to furnish certified paid receipts for additional artisans, equipment rental, materials, and engineering services that are required to perform the work prior to payment by the Department. Increased bond premium for additional artisans, equipment rental, materials, and engineering services will be paid after a certified paid receipt is submitted showing payment of the increased bond.

NON-BID ITEMS

For work not covered by the various bid items in this Contract, it is the intent to pay for such related work on a time and materials basis, as required by the Engineer. The payment for such work is outlined in the following sections: Payment for Materials, and Payment for Rental Equipment.

PAYMENT FOR MATERIALS

The Contractor will be paid the actual cost for materials that are required to maintain or repair a bridge but are not covered under the Contract bid Items plus ten (10) percent. Any arrangements for the purchase of materials will be considered incidental. However, no materials shall be ordered until approved by the Engineer and competitive prices may be required if the Engineer directs.

All materials which are necessary to perform the work under the various contract bid items shall be incidental to those Items at no additional compensation.

PAYMENT FOR RENTAL EQUIPMENT

The Contractor will be paid the actual rental cost for the equipment, which may be required to perform certain repair work that has not been included in the contract bid items, plus ten (10) percent. However, no equipment shall be rented until approved by the Engineer. The rental equipment shall not be part of the tradesman basic toolbox as specified under Item 100.1 Base Labor Rate.

Contractor-owned equipment required under this contract, (with the exception of equipment listed under the various artisans' descriptions in Item 100.1 Base Labor Rate will be reimbursed in the format outlined under Subsection 9.03 "Payment for extra Work" Section C of the Standard Specifications. Rental Equipment will not carry any overtime premium rate after being in full operation for more than 8 hours in a day.

NON-BID ITEMS (Continued)

Unless the rented equipment cost includes the operator, the Contractor will receive compensation for the operator of the “Rental Equipment” used for “Related Work” as specified in Item 100.1 Base Labor Rate.

The Contractor must get the authorization of the Resident Engineer before any equipment is rented and competitive prices may be required if the Engineer directs.

All rental equipment and tools shall be in excellent working condition. The Contractor shall not be paid for equipment down time, at the discretion of the Engineer.

The actual cost for rental equipment shall be judged in accordance with the rate specified in the Rental Blue Book and it is the Contractor's responsibility to provide a copy of this Blue Book to the Department. The rental for equipment will be paid on an hourly basis and will not carry any overtime rate after eight hours of operation.

All rental equipment and tools which are necessary to prosecute the work under the various contract bid items shall be incidental to those Items at no additional compensation.

COST ESTIMATES

Where the scope of a repair task can be adequately determined and described, the Contractor, when required by the Engineer, shall be required to submit a Cost Estimate for the repair task.

Each Cost Estimate, submitted in writing, shall include an itemized scope of work, a working schedule (including the number of working days and hours worked each day by each category of artisan), work procedures and a NOT-TO-EXCEED cost breakdown itemized by the following: the number and type of workers, the number and type of equipment, barges, materials, traffic controls and police, etc. The Cost Estimate submittal must also state if roadway closures and waterway and/or bridge closures will be required.

The Engineer will approve each Cost Estimate submittal in writing. A submittal does not guarantee the Contractor will be assigned the work. Payment will be based on actual hours worked at the contractual rates for various items as previously described, up to the maximum task amount.

Completion of the task is the sole responsibility of the Contractor once the not-to-exceed amount has been reached. Should unforeseen problems develop during the task completion, the Contractor will submit to the Engineer a revised scope of work with a comparison to the original scope of work along with a breakdown of the additional costs for approval by the Engineer. Approval for any increases to the agreed upon not-to-exceed cost will be dependent upon the justification of the additional work.

If the Contractor performs work which is not provided for in this Contract, or which was not authorized in writing by the Engineer, said Contractor shall receive no compensation for such work.

NON-BID ITEMS (Continued)

The management of the project and generating Cost Estimates, including such items as the planning of repair details, hiring of subcontractors, meetings with affected parties, scheduling of required artisans, purchasing of the necessary materials and the arrangement of equipment rentals, etc., will be considered incidental to the work and as such no additional compensation will be provided.

RATES OF PAYMENT

Payment for Non-Bid Items and Item 100.1 Base Labor Rate will be made for time spent on the project doing actual work on the Department's bridges and shall NOT include travel time to and from the Contractor's place of business, and it shall also not include time for investigative field trips to find out how much material, equipment, tools, etc., may be needed for the work.

All equipment, materials, engineering costs and artisans' compensation which are necessary to prosecute the work under the various contract bid items shall be incidental to those bid Items, at no additional compensation.

Note: For work covered by bid items in this contract and those not covered, there may be situations where the Department has pertinent materials or equipment stockpiled. The Department reserves the right to utilize these materials or equipment as seen fit in the prosecution of the work.

The Contractor will be reimbursed for the total actual cost (plus a percentage markup as indicated) for materials and equipment rental, as required for related work required by the Engineer. Artisans will be compensated as specified in Item 100.1 "Base Labor Rate". The Contractor will not bid the materials and equipment rental.

Payment for Non-Bid Items will be based on bills submitted, covering all charges for labor, materials, and equipment according to the respective terms of the contract. Bills covering the total charges incurred in any given month are to be submitted by the fifteenth of the following month for processing.

The Contractor is encouraged to submit bills/invoices of all charges to the Engineer by the 15th of the following month. It shall be required that the Contractor furnish certified copies of any or all payrolls for the Contract, showing the name, address, and occupational classification of each employee on said works, the hours worked by, and the wages paid to such employee.

EXPLORATORY EXCAVATION AND WORK

Non-bid Items shall be used to verify the potential location, condition, size, alignment, direction, and damage to portions of the existing bridge approach slab and adjacent abutment backfill due to the historic infiltration of water. Additionally dye water shall be poured at locations specified by the Engineer to monitor its path.

Removal of the fill adjacent to the abutment for the installation of the medial apron and as required on the plans over the existing approach slab shall be performed prior this work and will not be paid under Time and Materials or Base Labor Rate. Dye water shall be used at locations and flow rates as required by the Engineer. Following the results of the dye water test, further excavation may be required including the potential removal of a section of the approach slab to properly locate and seal the potential leak and prevent re-damaging the abutment slope paving. If additional removal is required, the contractor is to submit a cost for supplemental work to meet the requirements of the Engineer. Only after the work order is approved can work resume.

The contractor is to advance the exploratory excavation using vacuum boring excavation, hand digging, conventional machine excavation, or a combination thereof subject to approval of the Engineer. If the technique used to advance the excavation is causing damage to the existing facilities, cease all work until an alternate method is approved by the Engineer.

Work only to be performed under the direct supervision and direction of the Engineer and access to document the necessary information shall be provided to the Engineer as requested.

All work will be paid under non-bid items.

DISPOSAL OF TREATED WOOD PRODUCTS

The presence of potential treated wood products is unknown at this time, but in the event that an assignment calls for the disposal of portions of treated timber, the Contractor must dispose of the materials in accordance with all applicable state and federal regulations at a licensed facility. The Contractor will be required to submit manifests and/or certificates of disposal to the Engineer prior to the completion of the contract. All work in conjunction with the proper testing, loading, transportation, and all incidental costs required for legal disposal of treated wood products shall be covered and paid under Non-Bid Items and Item 100.1 Base Labor Rate when needed and as required by the Engineer.

EROSION AND SEDIMENT CONTROL

The Engineer has the authority to limit the surface areas of erodible earth material exposed by excavation, borrow and fill or similar operations, and to direct the Contractor to provide immediate, permanent, or temporary control measures to prevent contamination of any adjacent bodies of water or drainage systems by installing compost filter tubes, staked hay bales, sedimentation basins, silt fences or other control devices. Work or methods as necessary to control erosion and sedimentation will be measured and paid according to Subsection 767 of the Standard Specifications.

The erosion and sediment control features installed by the Contractor shall be satisfactorily maintained by the Contractor until acceptance of work under this Contract.

In the event of conflict between these Specifications and Laws, Rules, or Regulations of local agencies, the more restrictive requirements shall apply.

If temporary erosion and sediment control measures become necessary due to the Contractor's negligence or carelessness, the control measures shall be performed at the Contractor's own expense.

Failure by the Contractor to control erosion, pollution, and/or siltation shall be cause for the Engineer to employ departmental action and/or outside assistance to provide the necessary corrective measures, the cost of which shall be deducted from the Contractor's monthly progress estimate.

CONTAMINATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. No soil may be disposed of off-site without proper assessment by the contractor and approval from the Engineer, District Environmental Engineer (DEE), or the project designee.

SOIL STOCKPILING DIRECTIVE P-22-001

Any stockpiling of soil must be performed in compliance with Policy Directive P-22-001, Off-Site Stockpiling of Soil from MassDOT Construction Projects. This directive limits the allowable locations for off-site stockpiling of soil generated during MassDOT projects and includes various requirements that must be satisfied by the contractor prior to off-site stockpiling.

ASBESTOS CONCERNS - ASBESTOS LIABILITY INSURANCE

Upon assignment of work, if asbestos-containing material (ACM) is anticipated to be encountered (for example - in the event that the removal of existing asphaltic plug joints from a bridge encounters roofing felt that may contain ACM), prior to any testing or removal of asbestos, Asbestos Liability Insurance shall be obtained for this project in accordance with Subsection 7.05 of the Standard Specifications. The Contractor and the Massachusetts Department of Transportation shall be named as additional insureds. Cost will be reimbursed to the Contractor.

All new construction materials shall be asbestos-free including any roofing felt, waterproofing materials, grout, sealer, or adhesives that may be used unless asbestos is specifically required.

If any existing material is a possible ACM, the Contractor must perform all asbestos inspection, testing, removal and proper disposal in accordance with the required rules and regulations included in the special provisions and as required by the Engineer. The Contractor will be reimbursed for the required work under Non-Bid Items, when needed and as required by the Engineer.

INSPECTION AND TESTING FOR ASBESTOS

The work shall include the inspecting and testing of all materials suspected of containing asbestos. When any demolition is required to enable the inspection and testing of the suspected material, it will be considered incidental to this work and the Contractor must perform all asbestos handling and testing in accordance with the regulations stated below.

The Contractor shall employ the services of a Massachusetts licensed "Asbestos Inspector" to inspect the material to determine whether removal of asbestos is required. Should the asbestos inspector determine laboratory testing is required, a state certified laboratory shall be used to perform all necessary tests.

Regulations

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), including but not limited to:

- 29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
- 29 CFR 1910 Section 134 Respiration Protection
- 29 CFR 1926 Construction Industry
- 29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
- 29 CFR 1910 Section 1200 Hazard Communication
- 29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

INSPECTION AND TESTING FOR ASBESTOS (Continued)

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985
p.28530 - 28540 Asbestos Abatement Projects Rule

40 CFR 61 Subpart A Regulation for Asbestos

40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

INSPECTION AND TESTING FOR ASBESTOS (Continued)

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise,
Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

Unless otherwise described in the contract, all work in conjunction with the inspection and testing of Asbestos shall be considered as a reimbursable expense. The Contractor will be compensated under Non-Bid Items as required by the Engineer.

REMOVAL AND DISPOSAL OF ASBESTOS

The work shall include the removal and satisfactory disposal of existing asbestos. The Contractor's attention is directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS". The Contractor should notify and coordinate efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

This section specifies the requirements for the handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

All asbestos material shall be removed and properly disposed of by a contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor and Industries. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance.

This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Abatement Supervisor and Asbestos Abatement Project Designer as required by 453 CMR 6.00.

Asbestos removal work shall be coordinated with all other work under the contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions which, in the opinion of the HASP, may pose a safety hazard to the workers.

Notification and Permits

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS (Continued)

Prior to starting any work, the Contractor shall also obtain any required asbestos removal permit(s) from the city/town. A copy of the permit(s) must be provided to the Engineer and posted at the work site.

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

Standard Operating Procedures

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.
2. Proper protective clothing and respiratory protection prior to entering the work spaces.
3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.
4. Proper exit practices from the work space through the showering and decontamination facilities.
5. Removing asbestos containing material in ways that minimize release of fibers.
6. Packing, labeling, loading, transporting, and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.
7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.
9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

Required Submittals

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLI certification of proposed Supervisors and Foreman responsible for asbestos work.
2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLI, EPA and OSHA standards.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS (Continued)

3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.
4. Written plan of action and standard operating procedures to include: Location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.
5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.
6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.
7. Name, location, and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and license number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during the project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.

Unless otherwise described in the contract, all work in conjunction with the inspection, testing, proper legal removal, and disposal of Asbestos shall be considered as a reimbursable expense. The Contractor will be compensated under Non-Bid Items as required by the Engineer.

FORMWORK AND SITEWORK

The temporary formwork used for supporting fresh concrete for repairs, must be removed, and disposed of by the contractor. Any formwork that is not removed and is reported by Bridge Inspection or other MassDOT personnel shall impose a damage of \$500.00 for each work location (On one bridge there may be multiple locations). Payment for this work shall be included in the unit price under the applicable item from which the material was obtained.

The Contractor is required to broom and clean all work site areas after the removal of excavated debris, regardless of the pre-existing conditions. These include areas excavated under joints such as pier caps, revetment areas. This removal of debris is incidental to the contract with no additional compensation.

All formwork placed during the life of this contract shall be removed no later than 45 days after the repair has been completed. Failure to do so may result in the formwork being removed by others with the costs being deducted from the contract quantity pay estimate.

MBTA FLAGGING

The Contractor shall provide a minimum two week notice for flagging support for MBTA bridges and railroads. This applies only to bridges and railroads operated by Keolis Commuter Services (KCS). This two-week notice does not apply to emergency work, only to routine or scheduled work activities. The contact person for advance request for flagging services is Rich Arnold, MBTA Railroad Operations Department, Phone number (617)-222-3635, email address: rarnold@mbta.com.

MBTA COMMUTER RAIL

Keolis Commuter Service (KCS) operates the commuter rail for the MBTA. All references to MBCR in the provisions will mean Keolis Commuter Service (KCS).

MBTA RAILROAD COORDINATION / ACCESS TO MBTA PROPERTY

The Contractor shall be required to coordinate the work of this Contract with the MBTA and Keolis Commuter Services Co. ("KCS") through the MassDOT Resident Engineer and MassDOT designated Field Staff. A majority of the prerequisites for the Contractor to perform work on or adjacent to MBTA transit lines may be found in the "MBTA Special Instructions" provided herein. The Contractor shall be required to comply with the all applicable requirements of the latest edition of the MBTA Special Instructions available at the time of Contract Award.

The Contractor will have to perform construction related activities on, over, under, within or adjacent to railroad property owned or controlled by the MBTA. Any work that will affect Commuter Rail operations, involve work on, over, under, within or adjacent to the commuter rail right of way must be coordinated with MBTA Railroad Operations and KCS and shall comply with the latest version of the MBTA Railroad Operations Directorate.

An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to MBTA property shall submit to the offices of the MBTA's designated representative, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities.

MBTA COORDINATION - SUBSTITUTE BUSING

Substitute bus transportation will be required for weekend MBTA Commuter Rail shutdowns. The Contractor must coordinate with MBTA Operations Department for provision of bus service. The Contractor shall contact MBTA Operations Dept. a minimum of 6 weeks prior to any planned rail shutdown. The MBTA will be responsible for planning, procuring, and administering the necessary substitute bus transportation services and operations based on the Contractor's approved work schedule.

Prime Contact:

Eric Ciborowski
32 Cobble Hill Road
Somerville, MA 02143
617-634-2567
ECIBOROWSKI@MBTA.com

Secondary Contact:

Delrico Gomes
32 Cobble Hill Road
Somerville, MA 02143
857-366-0404
DGOMES@MBTA.COM

The Contractor shall be required to attend the MBTA Weekly Track Outage Schedule Coordination Meetings held Wednesdays at 10:00 am at 32 Cobble Hill Road in the small classroom located in the training area at the rear of the building.

SCHEUDLE OF WORK

All proposed work hours shall conform to Subsection 7.09 and be subject to the written approval of the Engineer.

On high volume and/or high-speed roadways, work may be restricted to non-peak hours or night work as required by the Engineer to avoid peak traffic volumes and to maintain safety and productivity.

Nighttime Work

All work locations requiring night hours, as approved by the Engineer, are restricted as follows:

Sunday:	9:00 PM to 5:00 AM Monday
Monday:	9:00 PM to 5:00 AM Tuesday
Tuesday:	9:00 PM to 5:00 AM Wednesday
Wednesday:	9:00 PM to 5:00 AM Thursday
Thursday:	9:00 PM to 5:00 AM Friday

Work may not proceed beyond the normal 8-hour day unless prior approval is obtained from the Engineer for that day. Approval to work beyond the scheduled work will only be given when special conditions exist that warrant working beyond the scheduled work, as determined by the Engineer.

The Contractor may schedule night shifts longer than 8-hours with approval of the Engineer. No additional compensation will be made for work scheduled during nighttime hours.

These time periods include the "set-up" and "breakdown" of the traffic pattern employed. No operations, personnel, or equipment will be allowed on the roadways except during working hours.

The Engineer may direct the Contractor to cease any operation that is deemed unsafe, or which unduly impedes traffic, with no additional expense to the Commonwealth.

The Contractor shall schedule work activities such that not more than one ramp will be closed during any given work period.

TRAFFIC ACCOMMODATION

(Supplementing Subsection 7.17)

Traffic control devices shall comply with the relevant provisions of Subsection 850, the applicable sections of the Manual on Uniform Traffic Control Devices for Streets and Highways with the MA Amendments, the Manual for Assessing Safety Hardware, and the following:

The order of precedence for the document that governs the positioning, sizing, color(s), shape, design, and operation of temporary traffic control devices shall be as set forth below:

1. Details for a specific location that have been designed by the Contractor and approved by the Engineer.
2. Details included in this contract.
3. MassDOT's Work Zone Safety Temporary Traffic Control (Document A00815 on this Contract), Typical Details and Massachusetts Guidelines for MassDOT, Municipalities, Utilities, and Contractors.
4. MassDOT's Standard Details and Drawings for the Development of Temporary Traffic Control Plans (<https://www.mass.gov/files/documents/2017/10/24/tcp.pdf>).
5. Massachusetts Amendments to the MUTCD (<https://www.mass.gov/doc/massachusetts-amendments-to-the-mutcd/download>).
6. Manual on Uniform Traffic Control Devices for Streets and Highways (<https://muted.fhwa.dot.gov/>).

During construction, the Contractor shall contact the Engineer for the most recent copy of the Work Zone Safety Temporary Traffic Control, Typical Details and Massachusetts Guidelines for MassDOT, Municipalities, Utilities, and Contractors.

Truck Mounted Attenuators (TMAs), when shown in any details, are mandatory. Truck Mounted Attenuators shall shadow Temporary Traffic Control service vehicles during setup and breakdown of all temporary traffic control setups on roadways with speeds greater than 45 mph.

Traffic police, when required, shall be located at a sufficient distance in advance of the work area, so that they can warn oncoming motorists of the work.

MassDOT reserves the right to provide certified Roadway Flaggers, who are MassDOT employees, at the discretion of the Engineer. The Contractor shall not be charged nor compensated for the use of MassDOT employee flaggers.

ENVIRONMENTAL REQUIREMENTS

This clause identifies procedures that shall be followed for bridges over or adjacent to waterways, wetlands, or other bodies of water. Some repairs may be needed in emergency situations where work needs to be performed prior to final permitting.

Bridges over non-tidal waterways will usually require Section 404 approval from the Army Corps of Engineers and Section 401 Water Quality Certification from the Department of Environmental Protection.

Repairs to bridges in tidal areas and/or navigable waters may require a Coast Guard Bridge Permit, and consistency review by Coastal Zone Management. Time frames for these bridges typically require 4 months for non-tidal bridge repairs and possibly longer for tidal bridge repairs. For permitting purposes, all proposed construction methods that may be required in, on or above water resources shall be identified. The proposed methods shall be reviewed with the District Environmental Engineer who will coordinate with the Environmental Division the appropriate review of permit applicability.

For emergency repairs, the District Environmental Engineer and/or Environmental Division shall be notified immediately for further guidance on obtaining appropriate approvals.

Where repairs or reconstruction will not involve work in any waterways, wetlands or other bodies of water, erosion and siltation controls shall be implemented to ensure that construction activity does not result in siltation of the adjacent water resources. This work, when needed, will be covered under Non-Bid Items and Item 100.1 (Base Labor Rate) as required by the Engineer. Regardless of exemptions from regulations, Enforcement Actions and/or Cease and Desist Orders due to resource damages resulting from construction activity may be invoked at any time.

ENVIRONMENTAL PERMITTING

If Contractor erection, demolition, storage, or other procedures require work to occur in or otherwise impact water or wetland resource, the Contractor is advised that no associated work can occur until all required environmental permits have been obtained allowing such work. The Contractor must notify the District Highway Director and Resident Engineer in writing at least 60 days prior to desired commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated through the District Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to obtain the environmental permits. As a supplement to Section 7.00 of the Standard Specifications, the Contractor is reminded that no debris of any type shall be allowed to enter waterways or wetland resource areas, either temporarily or permanently.

Upon execution of this contract, the Contractor shall assume all responsibility and will be held accountable with regard to complying with any and all environmental permits issued for the work covered under this Contract. The Contractor is advised that no additional compensation will be allowed for work required to achieve compliance with any issued environmental permit as payment for the work shall be included in the various bid items.

EMERALD ASH BORER ADVISORY

To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When trees or brush must be removed, such as in urban, or otherwise populated areas, Contractor shall identify proposed location for disposal, and provide written notification to the Engineer for approval. Disposal shall be in city or town of project, or at minimum, within county, of construction operations.

PAINTED CONCRETE

If the project involves work that will impact coated concrete, this coating may contain lead. The contractor must test the coating to determine whether lead is present. If lead is present, all work shall be performed in accordance with the OSHA standards contained in 29 CFR Part 1926.62 – Lead. Dust and debris shall be prevented from entering the environment (including but not limited to soil, air, and water). The contract shall comply with all applicable conditions of Section 961.68 “Handling of Hazardous Waste and Reporting Release Programs” and Section 961.69 “Submittals” of the 2020 MassDOT Standard Specifications for Highways and Bridges.

NOTICE TO OWNERS OF UTILITIES*(Supplementing Subsection 7.13)*

District 5 Utility/Constructability Engineer

Chris Lockett (857) 368-5073

Chris.Lockett@dot.state.ma.us

If available, existing bridge plans indicate the location of the existing known utilities in the vicinity of the work. As the accuracy and completeness of the plans are not guaranteed in any manner, it is the Contractor's responsibility to make their own investigation to assure that no damage to existing structures, drainage lines, traffic signal conduits, etc., will occur.

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities of the Contractor's intention to commence operations affecting such utilities at least one week in advance of the commencement of such operations and the Contractor shall at that time file a copy of such notice with the Engineer.

A list of public and private utilities can be found on the MassDOT website at:
<https://www.mass.gov/info-details/utility-contacts-by-district-and-municipality>

Select the District 5 tab and then select Middleborough

The utility contact list is for guidance only and is not guaranteed to be complete or up to date.

NOTIFICATION OF PUBLIC OFFICIALS

Town officials are shown at website <https://www.mass.gov/lists/massachusetts-cities-and-towns> and select the required City/Town website.

State Police are shown at website <https://www.mass.gov/info-details/massachusetts-state-police-troop-boundaries>. Select the area of jurisdiction to find the local station.

The Contractor shall be responsible for informing the following officials in each area that he is assigned to work in:

Superintendent, Department of Public Works, or Town Engineer; Superintendent, Water Department, Superintendent, Sewer Departments; Police Department, Fire Department, Electric Company, Railroads.

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

GAS:

Outage/ Emergency: 800-592-2000

New Service: 866-678-2744

Customer Support: 800-592-2000

ELECTRIC:

Outage/ Emergency: 800-592-2000 or 844-726-7562

New Service: 1-888-633-3797 (1-888-need pwr)

Customer Support: 1-800-340-9822

NORTHERN LONG-EARED BAT PROTECTION

The U.S. Fish and Wildlife Service (USFWS) has listed the northern long-eared bat (NLEB) as Endangered under the Endangered Species Act (ESA) and the following requirements exist to protect the bat and its habitat. As there is no Federal nexus (Federal funding or permits) for this project Section 7 consultation was not required or conducted. However, Section 9 of the ESA prohibits anyone from “taking” or harming an endangered species, and the below language shall be adhered to in order to maintain compliance with the ESA.

If any of the project locations require work within U.S. Army Corps of Engineers (ACOE) jurisdictional wetlands, the ACOE will be the lead federal agency for ESA consultation with the U.S. Fish & Wildlife Service (USFWS). Most consultations for the NLEB take 30 days.

The following Avoidance and Minimization Measures (AMMs) must be strictly adhered to in order to protect NLEB and to be in compliance with the ESA. Contact MassDOT Environmental Services - Wildlife & Endangered Species Unit Supervisor (David Paulson, david.j.paulson@dot.state.ma.us, 857-262-3378) for questions about project limits, restrictions, or conservation measures.

The range of the NLEB in Massachusetts was revised in early 2023, and some AMMs may no longer be applicable at some project locations. The Resident Engineer can check on the status of AMM applicability by sending a locus map of the proposed work to MassDOT Highway Division's Environmental Services Section - Wildlife & Endangered Species Unit Supervisor for review and a determination if some of the AMMs and TOY restriction can be waived.

Required AMM for all projects:

- The Contractor shall ensure all personnel working on the project site are aware of all environmental commitments related to NLEB, including all applicable AMMs. NLEB Bat information (<https://www.fws.gov/midwest/endangered/mammals/nleb/>) shall be made available to all personnel.

NORTHERN LONG-EARED BAT PROTECTION (Continued)

If temporary lighting is proposed within the project scope, the following AMM is applicable:

Lighting AMM:

- Direct temporary lighting away from suitable habitat during the active season: **April 1 to October 31.**

If the Removal of Trees and/or Woody Vegetation >3-inch in diameter is proposed within the project scope, the following AMMs are applicable:

Tree AMMs:

- If additional cutting is proposed by the Contractor that is outside the scope of this contract, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.
- Ensure tree removal is limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).
- In order to protect northern long-eared bats and their young during their active season, **no tree cutting shall be conducted during the Time of Year (TOY) restriction of April 1 to October 31.**
- Do not remove **documented** or NLEB roosts that are still suitable for roosting, or trees within 0.25 miles of roosts, or **documented** foraging habitat any time of year (<http://www.mass.gov/eea/agencies/dgf/dfw/natural-heritage/species-information-and-conservation/rare-mammals/northern-long-eared-bat.html>).
- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB, including the TOY restriction.

If the Bridge Work is proposed within the project scope, the following AMMs are applicable:

Bridge AMMs:

- **Bridge AMM 1** - To completely avoid direct effects to roosting bats, perform any bridge removal, replacement, and/or maintenance work during the winter hibernation period unless a hibernating colony of bats is present (contact your local USFWS Field Office for exact dates). Also, follow Bridge AMM 4.
 - **Note:** Bridge AMM 1 is an avoidance measure for direct effects; the full implementation of which may not always be practicable. **If bridge removal, replacement, and/or maintenance work must be performed outside of the winter hibernation period, then follow Bridge AMMs 2-4.**

NORTHERN LONG-EARED BAT PROTECTION (Continued)

- **Bridge AMM 2 - Colony or Assuming Presence of Bats**
 - If assuming presence of bats or if bridge assessment or P/A surveys suggest presence of a colony of bats, and work is conducted during the active season, ensure activity will not disturb bats. The following types of bridge work can generally be conducted with the presence of bats:
 - above deck work where construction equipment or materials do not extend to the underside of deck where bats may be located (e.g., materials that may drip down to underside of deck), or does not include percussives (vibration) or noise levels above general traffic (e.g., road line painting, wing-wall work).
 - below deck work that is conducted away from roosting bats and does not involve percussives or noise level above general traffic (e.g., wing-wall work, some abutment, beam end, scour, or pier repair).
- **Bridge AMM 3 - Small Number of Bats**
 - If bridge assessment or P/A surveys suggest presence of a small number of bats (<5 – not a colony), and work is conducted during the active season, the following types of bridge work can generally be conducted with the presence of bats:
 - above deck work where construction equipment or materials do not extend to the underside of deck where bats may be located (e.g., materials that may drip down to underside of deck), or does not include percussives (vibration) or noise levels above general traffic (e.g., road line painting, wing-wall work).
 - below deck work that is conducted away from roosting bats and does not involve percussives or noise level above general traffic (e.g., wing-wall work, some abutment, beam end, scour, or pier repair).
 - any other bridge removal, replacement, and/or maintenance work (which may include activities with percussives) conducted in the evening while the bats are feeding, starting one hour after sunset, and ending one hour before daylight excluding the hours between 10 p.m. and midnight and keep the light localized.
- **Bridge AMM 4 - If assuming presence of bats, or if bridge assessment or P/A surveys suggest presence of bats, ensure suitable roosting habitat is maintained. Suitable roosting sites may be incorporated into the design of a new bridge.**

PIGEON WASTE

The Contractor shall remove and dispose of the pigeon waste and any other debris accumulated on the steel members and bridge seats in areas where work is being performed. Pigeon waste and debris material contaminants will require special handling and disposal in accordance with all Federal, state, and local requirements. No separate payment will be made for removal and disposal of pigeon waste. Cost shall be incidental to the contract pay items.

**GENERAL REQUIREMENTS FOR DEMOLITION AND
WORK INVOLVING PAINTED STEEL**

(02/06/2020)

Demolition and work involving painted steel shall conform to the requirements of Subsection 961 of the Standard Specifications.

Work Involving Painted Steel.

Hazardous materials shall be removed in the immediate area of any intended welding, heating, saw cutting or burning of steel. Hazardous material removal is required to allow the demolition of structural steel, railings, drainage systems, utility supports, steel lamp posts, etc.

The contractor shall assume that the coatings on the steel contain lead (Pb), unless otherwise determined by testing. The contractor shall certify in writing to the Engineer the results of all testing, and shall also certify that any lead (Pb) coated steel removed from the project was not reused or buried, but was sent to a scrap metal recycling facility.

Implement and maintain programs and procedures, which comply with the requirements of this specification and all applicable standards and regulations. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the regulation of this specification, follow the more restrictive requirements.

This requirement is intended only for the demolition and preparation prior to repair and does not include provisions for recoating of steel.

Environmental

All applicable portions of Subsections 961.65 “Worker Protection” and 961.66 “Environmental Protection and Monitoring” shall be followed when performing this work.

During chemical stripping a hand washing facility may be used in lieu of a decontamination/changing facility.

Hazardous material shall be collected during the disassembly and disposed of as outlined in Subsection 961.68 “Handling of Hazardous Waste and Reporting Release Programs”.

The applicable submittals shall be according to Subsection 961.69 “Submittals”.

**GENERAL REQUIREMENTS FOR DEMOLITION AND
WORK INVOLVING PAINTED STEEL** (Continued)**Cleaning/Removal****Cutting Or Burning Of Steel**

All surfaces to be welded, heated, saw cut or burned shall be cleaned so as to remove all contaminants and/or hazardous materials, which could be discharged to the environment as a function of the subsequent operations.

Lead paint shall be removed in its entirety in an area prescribed by a 6 inch (15 cm) minimum offset from the required work. The paint removal operation may be dry abrasive blasting, wet abrasive blasting or chemical stripping.

Proper level of containment shall be used when performing this work in accordance with Subsection 961.67 "Containment". Full containment is not required during chemical stripping operation however; the Contractor shall install proper shielding and/or tarpaulins under the chemical stripping operations in order to catch all debris generated during this procedure. A cleaned area must be inspected and approved before the demolition operations are started.

During cleaning operations the Contractor shall be required to furnish and erect temporary floodlights illuminating the steel surface at a minimum of 30-foot candles. This lighting shall be used in areas where there is insufficient lighting for proper cleaning operations and inspection. The Contractor shall supply electrical power.

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls and safe access to the work.

Mechanical Disassembly Of Steel

All surfaces to be mechanically disassembled by shear cutting or removing bolts or rivets shall not require deleading. When shear cutting or removing bolts or rivets, the Contractor shall not use any method that will cause dust and/or particles to be emitted and/or dispersed into the environment to an extent that would expose the workers above the Action Levels of 30 μ g/m³.

For purposes of limiting the lead (Pb) dust, the Contractor will be required to dampen the lead paint work areas.

The contractor shall install a proper shielding and/or tarpaulins under all lead-paint-coated surfaces to be shear cut or bolts or rivets ordered removed in order to catch any loose lead paint chips, dust or particles.

SECTION 6.00: CONTROL OF MATERIALS

Subsection 6.01: Source of Supply and Quality

Replace this subsection with the following:

The Engineer may approve material at the source of supply before delivery to the project.

The Department reserves the right to require approval of the source of supply for any material to be incorporated into the work prior to delivery or manufacture.

The Engineer reserves the right to prohibit the use of materials, products, or components which, in their opinion, may be supplied in a manner not reasonably consistent with contract requirements.

The determination of the Engineer shall be final upon all questions which pertain to supplier approval.

Fabricators of structural steel, miscellaneous steel and aluminum products, and producers of precast concrete and prestressed concrete must be on the Department's approved fabricators list on the date the bids are opened. Only approved fabricators will be allowed to perform work for the Department.

The Contractor shall furnish all materials required for the work specified in the Contract. Said materials shall meet the requirements of the specifications for the kind of work involving their use. For any materials named or described in these specifications, an approved equivalent to that named or described in the said specifications, may be furnished.

Chapter 7, Section 22, Clause 17, of the General Laws, as amended, shall apply to the purchase by the Contractor of supplies and materials to be used in the execution of this Contract.

The rules referred to require a preference in the purchase of supplies and materials, other considerations being equal, in favor first, of supplies and materials manufactured and sold within the Commonwealth, and second, of supplies and materials manufactured and sold within the United States.

All iron and steel products, manufactured products, and construction materials shall comply with all Federal Buy America and Federal Build America Buy America (BABA) requirements, where applicable.

In Contracts requiring structural steel, precast, or prestress concrete, the Contractor shall furnish approved shop drawings, and fabrication procedures to the Department's inspector at the supply source or fabrication site. Materials for permanent construction shall be new, shall conform to the requirements of these specifications, and shall be approved by the Engineer.

SECTION 6.00 (Continued)

Materials for temporary structures or supports adjacent to traveled ways, the failure of which would compromise the safety of the public or the traveled ways, need not be new but the Contractor shall be required to submit certification by a Structural Professional Engineer that the material meets the requirements for the intended use and shall be approved by the Engineer. Any fabrication shall conform to the requirements of these specifications. These requirements shall not apply to gantry systems and supports as well as other mechanized systems.

If testing finds that an approved supplier does not furnish a uniform product, or if the product from such source proves unacceptable at any time, the Contractor shall, at their own expense, take any and all steps necessary to furnish approved materials.

The Contractor shall submit to the Department for approval a notarized Certificate of Compliance (COC) from the Manufacturer or Supplier for each kind of manufactured or fabricated material furnished.

The COC shall certify compliance with the specifications and shall contain the following information:

1. Contract Number, City or Town, Name of Road and Federal Aid Number;
2. Name of the Contractor to which the material is supplied;
3. Kind of material supplied;
4. Quantity of material represented by the certificate;
5. Means of definitively identifying the consignment, such as invoice number, lot number, bill of lading number, label, marking, etc.;
6. Date and method of shipment;
7. Statement indicating that the material has been tested and found in conformity with the pertinent parts of the Contract;
8. Statement indicating that the material meets the requirements of Buy America and BABA, where applicable;
9. Results of all required tests including the chemical analysis in the case of metal: or in lieu of furnishing the results a statement that results of all required tests pertinent to the certificate and not submitted shall be maintained available by the undersigned for a period of not less than three years from date of final acceptance or not less than three years from date of final payment (whichever period is the longest shall apply).
10. Signature of a person having legal authority to bind the supplier.

SECTION 6.00 (Continued)

These COCs shall be delivered to the contract site at the same time that the materials are delivered and before such materials are incorporated into the work. The Contractor shall attach to the COC a document listing the contract bid item number(s), sub item(s), or lump sum breakdown item number(s), as applicable, under which the material will be compensated. Payment for the item in which the materials are incorporated may be withheld until these COCs are received in a form that meets the contract requirements.

If the Contractor has new materials purchased for use on a previous Department Contract which have never been used and which comply with the specifications, these materials may be furnished and used. The Contractor shall submit their own sworn statement certifying that such materials were purchased for use on a previous Contract (naming and identifying such Contract) and shall attach the original COC.

Any cost involved in furnishing the certificate shall be borne by the Contractor.

Subsection 6.03: Delivery and Storage of Materials

Replace this Subsection with the following:

Materials and equipment shall be progressively delivered to or removed from the site so that there will be neither delay in the progress of the work nor an accumulation of materials that are not to be used or removed within a reasonable time. All materials shall be stored in pre-approved locations per the conditions of the property owner.

Delivered materials and materials originating from the site, shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection.

Approved portions of the State Highway Layout (SHLO) may be used for storage of project materials and for the placing of the Contractor's plant and equipment upon obtaining a state highway access permit. All storage sites shall be restored to their original condition by the Contractor. No additional compensation shall be given for the design, construction, preparation, or restoration of the storage site(s) or obtaining the access permit which may include but is not limited to a Traffic Management Plan (TMP), utilities, and lighting.

The application for a permit shall contain a locus map identifying the proposed location, a description of the specific activities and uses of the staging area, a TMP in accordance with Subsection 7.10 depicting minimum setbacks from the roadway and any existing structures for stored materials and equipment and how equipment will safely access and exit the staging area.

Any additional space required must be provided by the Contractor at their expense. Municipal, private, or other state-owned property shall not be used for storage purposes without written permission of the owner or lessee, and copies of such written permission shall be furnished to the Engineer.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

The District Highway Director (DHD) may authorize work to continue during these specified time periods if it is determined by the District that the work will not negatively impact the traveling public. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic

Below are the holiday work restrictions:

New Year's Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Martin Luther King's Birthday (Federal Holiday)

No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

President's Day (Federal Holiday)

No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Evacuation Day (Suffolk County State Holiday)

No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)

Work restrictions will be in place for Districts 3 and 6 along the entire Boston Marathon route and any other locations that the DHD in those districts determine are warranted so as to not to impact the marathon. All other districts work restrictions will be as per DHD.

Mother's Day

No work on Western Turnpike and Metropolitan Highway System from 5:00 AM on the Friday before, until the normal start of business on the following day.

Memorial Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

HOLIDAY WORK RESTRICTIONS (Continued)**Bunker Hill Day (Suffolk County State Holiday)**

No work restrictions due to traffic concerns.

Juneteenth

No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Independence Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Labor Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)

No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)

No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)

No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)

No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

An integrated cost and schedule controls program shall be implemented by the Contractor to track and document the progress of the Work from Notice to Proceed (NTP) through the Contractor Field Completion (CFC) Milestone. The Contractor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort required by the Department's work force and consultants and as a critical decision-making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both accurate and updated as required by the specification throughout the life of the project. Detailed requirements are provided in Division II, Section 722 Construction Scheduling.

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

In accordance with the provisions of Section 8.00 Prosecution and Progress, utility coordination is a critical aspect to this Contract. This section defines the responsibility of the Contractor and MassDOT, with regard to the initial utility relocation plan and changes that occur as the prosecution of the Work progresses. The Engineer, with assistance from the Contractor shall coordinate with Utility companies that are impacted by the Contractor's operations. To support this effort, the Contractor shall provide routine and accurate schedule updates, provide notification of delays, and provide documentation of the steps taken to resolve any conflicts for the temporary and/or permanent relocations of the impacted utilities. The Contractor shall provide copies to the Engineer of the Contractor communication with the Utility companies, including but not limited to:

- Providing advanced notice, for all utility-related meetings initiated by the Contractor.
- Providing meeting minutes for all utility-related meetings that the Contractor attends.
- Providing all test pit records.
- Request for Early Utility work requirements of this section (see below).
- Notification letters for any proposed changes to Utility start dates and/or sequencing.
- Written notification to the Engineer of all apparent utility delays within seven (7) Calendar Days after a recognized delay to actual work in the field – either caused by a Utility or the Contractor.
- Any communication, initiated by the Contractor, associated with additional Right-of-Way needs in support of utility work.
- Submission of completed Utility Completion Forms.

B. PROJECT UTILITY COORDINATION (PUC) FORM

The utility schedule and sequence information provided in the Project Utility Coordination Form (if applicable) is the best available information at the time of the bid and has been considered in setting the contract duration. The Contractor shall use all of this information in developing the bid price and the Baseline Schedule Submission, inclusive of the individual utility durations sequencing requirements, and any work that has been noted as potentially concurrent utility installations.

C. INITIATION OF UTILITY WORK

The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

- 1) Contractor's accepted Baseline Schedule
- 2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
- 3) An approved Proposal Schedule

C.1 - BASELINE SCHEDULE – UTILITY BASIS

The Contractor shall provide a Baseline Schedule submission in accordance with the requirements of Subsection 8.02 and inclusive of all of the information provided in the PUC Form that has been issued in the Contract documents. This is to include the utility durations, sequencing of work, allowable concurrent work, and all applicable considerations that have been depicted on the PUC Form.

SUBSECTION 8.14 (Continued)**C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE**

All early utility work is defined as any anticipated/required utility relocations that need to occur prior to the Baseline Schedule acceptance. In all cases of proposed early utility relocation, the Contractor shall present all known information at the pre-construction conference in the form of a ‘sub-net’ schedule showing when each early utility activity needs to be issued a notice-to-proceed. The Contractor shall provide advance notification of this intent to request early utility work in writing at or prior to the Pre-Construction meeting. Prior to officially requesting approval for early utility work, the Contractor shall also coordinate with MassDOT and all utility companies (private, state or municipal) which may be impacted by the Contract. If this request is acceptable to the Utilities and to MassDOT, the Engineer will issue a notice-to-proceed to the affected Utilities, based on these accepted dates.

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM

If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contractor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

D. UTILITY DELAYS

The Contractor shall notify the Engineer upon becoming aware that a Utility owner is not advancing the work in accordance with the approved utility schedule. Such notice shall be provided to the Engineer no later than seven (7) calendar days after the occurrence of the event that the Contractor believes to be a utility delay. After such notice, the Engineer and the Contractor shall continue to diligently seek the Utility Owner’s cooperation in performing their scope of Work.

In order to demonstrate that a critical path delay has been caused by a third-party Utility, the Contractor must demonstrate, through the requirements of the monthly Progress Schedule submissions and the supporting contract records associated with Subsection 8.02, 8.10 and 8.14, that the delays were beyond the control of the Contractor.

SUBSECTION 8.14 (Continued)

All documentation provided in this section is subject to the review and verification of the Engineer and, if required, the Utility Owner. In accordance with MassDOT Specifications, Division I, Subsection 8.10, a Time Extension will be granted for a delay caused by a Utility, only if the actual duration of the utility work is in excess of that shown on the Project Utility Coordination Form, and only if;

- 1) proper Notification of Delay was provided to MassDOT in accordance with the time requirements that are specified in this Section
- 2) the utility delay is a critical path impact to the Baseline Schedule (or most recently approved Progress Schedule)

E. LOCATION OF UTILITIES

The locations of existing utilities are shown on the Contract drawings as an approximation only. The Contractor shall perform a pre-construction utility survey, including any required test pits, to determine the location of all known utilities no later than thirty (30) calendar days before commencing physical site work in the affected area.

F. POST UTILITY SURVEY – NOTIFICATION

Following completion of a utility survey of existing locations, the Contractor will be responsible to notify the Engineer of any known conflicts associated with the actual location of utilities prior to the start of the work. The Engineer and the Contractor will coordinate with any utility whose assets are to be affected by the Work of this Contract. A partial list of utility contact information is provided in the Project Utility Coordination Form.

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

The Contractor shall notify the Engineer in advance of any meeting they initiate with a Utility Owner's representative to allow MassDOT to participate in the meeting if needed.

Prior to the Pre-Construction Meeting, the Contractor should meet with all Utility Owners who will be required to perform utility relocations within the first 6 months of the project, to update the affected utilities of the Project Utility Coordination Form and all other applicable Contract requirements that impact the Utilities. The Contractor shall copy the Engineer on any correspondence between the Utility Owner and the Contractor.

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

The Engineer will be responsible for recording daily Utility work force reports. The start, suspension, re-start, and completion dates of each of the Utilities, within each phase of the utility relocation work, will be monitored and agreed to by the Engineer and the Contractor as the work progresses.

I. ACCESS AND INSPECTION

The Contractor shall be responsible for allowing Utility owners access to their own utilities to perform the relocations and/or inspections. The Contractor shall schedule their work accordingly so as not to delay or prevent each utility from maintaining their relocation schedule.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

On all projects, the “Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment” Regulation (2 CFR 200.216) prohibits the Contractor from using or furnishing the following telecommunications equipment or services:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.
- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

This prohibition applies to all products manufactured by the aforementioned companies, including any individual components or parts.

By submitting a bid on a project, the Contractor certifies that all work will be in compliance with the terms of 2 CFR 200.216. The Contractor shall submit a COC indicating compliance with the above provisions for all telecommunications equipment or services included in the Contract.

Payment for the item in which the materials are incorporated may be withheld until these COCs are received. Any cost involved in furnishing the certificate(s) shall be borne by the Contractor.

SECTION 722 CONSTRUCTION SCHEDULING

DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule when required in this Subsection. These requirements are in addition to, and not in limitation of, requirements imposed in other sections.

The requirements for scheduling submissions are established based on the Project Value at the time of the bid and are designated as Type A, B, C or D. The definitions of these Schedule Requirement Types are summarized below. Complete descriptions of all detailed requirements are established elsewhere in this specification.

Type A – for all Site-Specific Contracts with a Project Value over \$20 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Resource-Loading
- Resources Graphic Reporting
- Cash Flow Projections from the CPM
- Cash Flow Charts
- Cost-loaded CPM
- Contractor-furnished CPM software, computer and training

Type B – for all Site-Specific Contracts with a Project Value between \$10 Million and \$20 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded CPM
- Resource-Loading
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

SECTION 722 (Continued)

Type C – for all Site-Specific Contracts with a Project Value between \$3 Million and \$10 Million

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software, computer and training

Type D - for all contracts with a Project Value less than \$3 Million; various locations contracts of any dollar amount; contracts with durations less than one-hundred and eighty (180) Calendar Days; and other contracts as determined by the Engineer.

- Bar chart schedule updated monthly or at the request of the Engineer (See Section 722.62.B - Bar Charts.)
- Monthly Projected Spending Report (PSR) (See Section 722.62.F - Projected Spending Reports.)

MATERIALS, EQUIPMENT, PERSONNEL

722.40 General

A. Software Requirements (Types A, B and C)

The Contractor shall use Primavera P6 computer scheduling software.

In addition to the requirements of Section 740 – Engineer’s Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the scheduling software, one (1) software license and one (1) computer capable of running the scheduling software for the duration of the Contract. This computer and software shall be installed in the Engineer’s Field Office within twenty-eight (28) Calendar Days after Notice to Proceed. The computer and software shall be maintained and serviced as recommended by the computer manufacturer and/or as required by the Engineer during the duration of the Contract at no additional cost to the Department. The Contractor shall provide professional training in the basic use of the software for up to eight (8) Department employees. The trainer shall be approved by the Engineer. This training shall be provided within twenty-eight (28) Calendar Days after Notice to Proceed.

B. Scheduler Requirements

For all schedule types, if the Contractor plans to use outside scheduling services, the scheduler shall be approved as a subcontractor by the Engineer.

For Type A, B and C Schedules the name of the Contractor’s Project Scheduler together with his/her qualifications shall be submitted to the Department for approval by the Engineer within seven (7) Calendar Days after NTP. The Project Scheduler shall have a minimum of five [5] years of project CPM scheduling experience, three [3] years of which shall be on projects of similar scope and value as the project for which the Project Scheduler is being proposed. References shall be provided from past projects that can attest to the capabilities of the Project Scheduler.

SECTION 722 (Continued)**CONSTRUCTION METHODS****722.60 General****A. Schedule Planning Session**

(Types A, B and C)

The Contractor shall conduct a schedule planning session within seven (7) Calendar Days after the Contractor receives the NTP and prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

1. the Work to be performed by the Contractor and its subcontractors;
2. the planned construction sequence and phasing; planned crew sizes;
3. summary of equipment types, sizes, and numbers to be used for each work activity;
4. all early work related to third party utilities;
5. identification of the most critical submittals and projected submission timelines;
6. estimated durations of major work activities;
7. the anticipated Critical Path of the project and a summary of the activities on that Critical Path;
8. a summary of the most difficult schedule challenges the Contractor is anticipating and how it plans to manage and control those challenges;
9. a summary of the anticipated quarterly cash flow over the life of the project.

This will be an interactive session and the Contractor shall answer all questions that the Department and its consultants may have. The Contractor shall provide a minimum of five (5) copies of a written summary of the information presented and discussed during the session to the Engineer. The Contractor's Baseline Schedule and accompanying Schedule Narrative shall incorporate the information discussed at this Schedule Planning Session.

B. Schedule Reviews by the Department (All Types)**1. Baseline Schedule Reviews**

The Engineer will respond to the Baseline Schedule Submission within thirty (30) Calendar Days of receipt providing comments, questions and/or disposition that either accepts the schedule or requires revision and resubmittal. Baseline Schedules shall be resubmitted within fifteen (15) Calendar Days after receipt of the Engineer's comments.

2. Contract Progress Schedule / Monthly Update Reviews

The Engineer will respond to each submittal within twenty one (21) Calendar Days. Schedules shall be resubmitted by the Contractor within five (5) Calendar Days after receipt of the Engineer's comments.

Failure to submit schedules as and when required could result in the withholding of full or partial pay estimate payments by the Engineer.

SECTION 722 (Continued)

722.61 Schedule Content and Preparation Requirements (Types A, B and C unless otherwise noted)

Each Contract Progress Schedule shall fully conform to these requirements.

A. LOGIC

The schedules shall divide the Work into activities with appropriate logic ties to show:

1. conformance with the requirements of this Section and Division I, Subsection 8.02 - Schedule of Operations
2. the Contractor's overall approach to the planning, scheduling and execution of the Work
3. conformance with any additional sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.03 - Prosecution of Work and Subsection 8.06 – Limitations of Operations.

B. ACTIVITIES

The schedules shall clearly define the progression of the Work from NTP to Contractor Field Completion (CFC) by using separate activities for each of the following items:

1. NTP
2. Each component of the Work defined by specific activities
3. Detailed activities to satisfy permit requirements
4. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before purchasing
5. The preparation and submission of shop drawings, procedures and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable
6. The review and return of shop drawings, procedures and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer
7. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third party work affecting the Contract
8. The Critical Path, clearly defined and organized
9. Float shall be clearly identified
10. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
11. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
12. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
13. Full Beneficial Use (FBU) Contract Milestone per the requirements of Subsection 8.03 - Prosecution of Work
14. Contractor's request for validation of FBU (ready to open to traffic)
15. The Department's confirmation of completed work to allow for FBU

SECTION 722 (Continued)

16. Substantial Completion Contract Milestone per the requirements of Subsections 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
17. Contractor's request for validation of Substantial Completion
18. Punchlist Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes and 8.03 - Prosecution of Work
19. Contractor confirmation that all punchlist work and documentation has been completed
20. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
21. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
22. Contractor Field Completion Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
23. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
24. Traffic work zone set-up and removal, night work and phasing
25. Early Utility Relocation (by others) that has been identified in the Contract
26. Right-of-Way (ROW) takings that have been identified in the Contract
27. Material Certifications
28. Work Breakdown Structure in accordance with the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:
<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>
29. For Type A and B Contracts only: All items to be paid, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

C. EARLY AND LATE DATES

Early Dates shall be based on proceeding with the Work or a designated part of the Work exactly on the date when the corresponding Contract Time commences. Late Dates shall be based on completing the Work or a designated part of the Work exactly on the corresponding Contract Time, even if the Contractor anticipates early completion.

SECTION 722 (Continued)

D. DURATIONS

Activity durations shall be in Work Days. Planned Original Durations shall be established with consideration to resources and production rates that correspond to the Contractor's Bid Price. Within all of the Department-required schedules, the Contractor shall plan the Work using durations for all physical construction activities of no less than one (1) Work Day and no greater than fourteen (14) Work Days, unless approved by the Engineer as part of the Baseline Schedule Review.

Should there be an activity with a duration that is determined by the Engineer to be unreasonable, the Contractor will be asked to provide a basis of the duration using bid documents, historic production rates for similar work, or other form of validation that is acceptable to the Engineer. Should the Contractor and the Engineer be unable to agree on reasonable activity durations, the Engineer will, at a minimum, note the disagreement in the Baseline Schedule Review along with a duration the Engineer considers reasonable and the basis for that duration. A schedule that contains a substantial number of activities with durations that are deemed unreasonable by the Engineer will not be accepted.

E. MATERIALS ON HAND (for Types A and B only)

The Contractor shall identify in the Baseline Schedule all items of permanent materials (Materials On Hand) for which the Contractor intends to request payment prior to the incorporation of such items into the Work.

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label as specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>

G. ACTIVITY IDENTIFICATION NUMBERS

The Contractor shall use the activity identification numbering system specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

H. ACTIVITY CODES

The Contractor shall use the activity codes specified in the MassDOT-Highway Division Contractor Construction Schedule Toolkit located online at the address above.

I. CALENDARS

Different calendars may be created and assigned to all activities or to individual activities. Calendars define the available hours of work in each Calendar Day, holidays and general or project-specific non-Work Days such as Fish Migration Periods, time of year (TOY) restrictions and/or area roadway restrictions.

SECTION 722 (Continued)

Examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Refer to the Project Special Provisions for specific restrictions.
- Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced. Refer to the Project Special Provisions for specific restrictions.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods: Refer to the Project Special Provisions for specific restrictions.
- Night-time paving and striping operations, traffic and temperature restrictions: Refer to the Project Special Provisions for specific restrictions.
- Utility Restrictions shall be as specified within the Contract.

J. FLOAT

For the calculation of float in the CPM schedule, the setting for *Retained Logic* is required for all schedule submissions, starting with the Baseline Schedule Submission. Should the Contractor have a reason to propose that an alternative calculation setting such as *Progress Override* be used, the Contractor shall obtain the Engineer's approval prior to modifying to this setting.

K. COST AND RESOURCE LOADING (Types A and B only)

For all Type A and B Schedules, the Contractor shall provide a cost and resource-loaded schedule with an accurate allocation of the costs and resources necessary to complete the Work. The costs and resources shall be assigned to all schedule activities in order to enable the Contractor to efficiently execute the Contract requirements and the Engineer to validate the original plan, monitor progress, provide cash flow projections and analyze delays.

1. Each schedule activity shall have an assigned cost that accurately represents the value of the Work. Each schedule activity shall have its resources assigned to it by craft and the anticipated hours to accomplish the work. Each schedule activity's equipment resources shall be assigned to it by equipment type and hours operated. Front-loading or other unbalancing of the cost distribution will not be permitted.
2. The sum of the cost of all schedule activities shall be equal to the Contractor's Bid Price.
3. Indicating the labor hours per individual, per day, by craft and equipment hours/day will be acceptable.

SECTION 722 (Continued)

4. The Engineer reserves the right to use the cost-loading as a means to resolve changes, disputes, time entitlement evaluations, increases or decreases in the scope of Work, unit price renegotiations and/or claims.
5. For all Type A and B Schedules, all subnets, fragnets, Proposal Schedules, and Recovery Schedules shall be cost and resource-loaded to help to quickly validate and monitor the duration of the Work to be performed.
6. For Type A Schedules, cost-loading of the schedule will also be used for cash flow projection purposes.
7. The cost-loading of each activity shall indicate the portion of the cost for that activity that is applicable to a specific bid item (cost account.) The total cost for each cost account must equal the bid item price.
8. For Type A Schedules, each month, the Contractor will be paid using the Cost-loaded CPM activities for Lump Sum payment items. This requirement supersedes any requirements elsewhere in this Contract regarding partial payments of schedule-of-values for all Lump Sum items.

L. NOT TO BE USED IN THE CONTRACTOR'S CPM SCHEDULE

1. Milestones or constraint dates not specified in the Contract
2. Scheduled work not required for the accomplishment of a Contract Milestone
3. Use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer
4. Delayed starts of follow-on trades
5. Float suppression techniques

722.62 Submittal Requirements

All schedules shall be prepared and submitted in accordance with the requirements listed below.

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

Except as stated elsewhere in this subsection, schedule submittals shall include each of the documents listed below, prepared in two formats, for distribution as follows:

- a. four (4) compact discs (CD); one (1) each for the Office of Project Controls and Performance Oversight (O-PC&PO), the Boston Construction Section Office, the District Construction Office and the Resident Engineer's Office. Additional copies shall be required if the work is performed in more than one district.
- b. two (2) hard copies plotted in color on 24" X 36" paper; one (1) copy each for the District Construction Office and the Resident Engineer's Office. No copies for the O-PC&PO and the Boston Construction Section Office. Additional copies shall be required if the work is performed in more than one district.

SECTION 722 (Continued)

A. Narratives

A written narrative shall be submitted with every schedule submittal. The narrative shall:

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent;
2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements;
3. provide all references to any Notice of Delay that has been issued, within the time period of the Contract Progress Schedule Update, by letter to the Engineer. Note that any Notice of Delay that is not issued by letter will not be recognized by the Engineer. See Subsection 722.64.A - Notice of Delay;
4. provide a description of each third-party utility's planned vs. actual progress and note any that are trending late or are late per the durations and commitments as provided in the PUC Form; provide a description of the five (5) most important responses needed from the Department and the need date for the responses in order to maintain the current Schedule of Record;
5. provide a description of all critical issues that are not within the control of the Contractor or the Department (third party) and any impact they had or may have on the Critical Path;
6. provide a description of any possible considerations to improve the probability of completing the project early or on-time;
7. compare Early and Late Dates for activities on the Critical Path and describe reasons for changes in the top three (3) most critical paths ;
8. describe the Contractor's plan, approach, methodologies and resources to be employed for completing the various operations and elements of the Work for the top three (3) most critical paths. For update schedules, describe and propose changes to those plans and verify that a Proposal Schedule is not required;
9. describe, in general, the need for shifts that are not 5 days/week, 8 hours/day, the holidays that are inserted into each calendar and a tabulation of each calendar that has been used in the schedule;
10. describe any out-of-sequence logic and provide an explanation of why each out-of-sequence activity does not require a correction, if one has not been provided, and an adequate demonstration that these changes represent the basis of how these activities will be built, including considerations for resources, dependencies and previously-approved production rates;
11. identify any possible duration increases resulting from actual or anticipated unit price item quantity overruns as compared to the baseline duration, with a corresponding suggestion to mitigate any possible delays to the Critical Path. If the delay is anticipated to impact the Critical Path, refer to Subsections 4.06 - Increased or Decreased Contract Quantities and 8.10 - Determination and Extension of Contract Time for Completion and submit a letter to the Engineer notifying of a potential delay;
12. include a schedule log consisting of the name of the schedule, the data date and the date submitted.

SECTION 722 (Continued)

B. Bar Charts (Types A, B, C and D)

One (1) time-scaled bar chart containing all activities shall be prepared and submitted using a scale that yields readable plots and that meets the requirements of Subsection 722.61 - Schedule Content and Preparation Requirements. Activities shall be linked by logic ties and shown on their Early Dates. Critical Paths shall be highlighted and Total Float shall be shown for all activities.

A second time-scaled bar chart shall also be prepared containing only the Critical Path or, if the Critical Path is not the longest path, the Longest Path using a scale that yields readable plots and that meets the requirements of Subsection 722.61 - Schedule Content and Preparation Requirements. Activities shall be linked by logic ties and shown on their Early Dates. Total Float shall be shown for all activities.

Bar Charts shall be printed in color and submitted on 11" X 17" paper or, if approved by the Engineer, as a .pdf file.

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period's bar chart onto the previous time period's bar chart for an easily-read comparison of progress during the present and previous reporting periods. The DASC shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit>

The reports described in Subsections D, E and F below shall be submitted with all of the schedules listed in Subsection 722.20 - General:

D. Activity Cost Report and Monthly Cash Flow Projections (Type A only)

With each Contractor Quantity Estimate (CQE), the Contractor shall submit an Activity Cost Report and Cash Flow Projection that includes all activities grouped by Contract Bid Item.

The Activity Cost Report shall be generated from the Schedule of Record and shall be the basis of the Monthly Cash Flow Projection. Within each contract Bid Item, activities shall be sequenced by ascending activity identification number and shall show:

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start and finish dates for each completed activity.

For Unit Price pay items, in addition to the above, estimates to complete and any variance to the estimated Contract quantity shall be shown.

E. Resource Graphs (Type A only)

Monthly and cumulative resource graphs for the remaining Contract period using the Early Dates and Late Dates in the Contract Progress Schedule shall be included as part of each schedule submittal.

SECTION 722 (Continued)

F. Projected Spending Reports (Types B, C and D)

A Projected Spending Report (PSR) shall be prepared and submitted in accordance with the instructions listed at the end of this section. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. If the difference between the Contractor's monthly projections vs. the actual spending is greater than 10%, the Contractor's monthly spending projection shall be revised and resubmitted within fifteen (15) Calendar Days.

The Projected Spending Report (PSR) shall be depicted in a tabular format and printed in color on 11 x 17-sized paper or larger as approved by the Engineer. For additional instructions and a template for preparing the Projected Spending Report (PSR), refer to the Contractor's Construction Schedule Toolkit located on the MassDOT-Highway Division website at:

<https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit> or consult with the District Construction Scheduler.

722.63. Progress Schedule Requirements

A. Baseline Schedule

The Baseline Schedule shall be due thirty (30) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule shall only reflect the Work awarded to the Contractor and shall not include any additional work involving Extra Work Orders or any other type of alleged delay. The Baseline Schedule shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements. Once the Baseline Schedule has been accepted by the Engineer, with or without comments, it shall represent the as-planned schedule for the Work and become the Contract Progress Schedule of Record until such time as the schedule is updated or revised under Subsections 722.63.C - Contract Progress Schedules / Monthly Updates, 722.64.C - Recovery Schedules and 722.64.D - Proposal Schedules.

The Cost and Resource-Loading information (Types A and B only) shall be provided by the Contractor within forty-five (45) Calendar Days after NTP.

The Engineer's review comments on the Baseline Schedule and the Contractor's responses to them will be maintained for the duration of the Contract and will be used by the Engineer to monitor the Contractor's work progress by comparing it to the Contract Progress Schedule / Monthly Update.

B. Interim Progress-Only Schedule Submissions

The first monthly update of the Contract Progress Schedule/Monthly Update is due within seventy (70) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule review period ends at sixty (60) Calendar Days after NTP, see Subsection 722.60.B - Schedule Reviews by the Department. If the Baseline Schedule has not been accepted within sixty (60) Calendar Days after NTP, an Interim Progress-Only Schedule shall be due within seventy (70) Calendar Days after NTP. The purpose of the Interim Progress-Only Schedule is to document the actual progress of all activities, including non-construction activities, from NTP until the Baseline Schedule is accepted.

SECTION 722 (Continued)

C. Contract Progress Schedules / Monthly Updates (Types A, B, C and D)

The first Contract Progress Schedule shall be submitted by the Contractor no later than seventy (70) Calendar Days after NTP. The data date for this first Progress Schedule shall be sixty (60) Calendar Days after NTP. Subsequent Progress Schedules shall be submitted monthly.

Each Contract Progress Schedule shall reflect progress up to the data date. Updated progress shall be limited to as-built sequencing and as-built dates for completed and in-progress activities. As-built data shall include actual start dates, remaining Work Days and actual finish dates for each activity, but shall not change any activity descriptions, the Original Durations, or the Original Resources (as planned at the time of bid), without the acceptance of the Engineer. If any activities have been completed out-of-sequence, the Contractor shall propose new logic ties for affected in-progress and future activities that accurately reflect the previously-approved sequencing. Alternatively, the Contractor may submit to the Engineer for approval an explanation of why an out-of-sequence activity does not require a correction and an adequate demonstration that the changes accurately represent how the activities will be built, including considerations for resources, dependencies and previously approved production rates. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

No revisions to logic ties; sequence, description or duration of future activities; or planned resource costs shall be made without prior approval by the Engineer.

Any proposed logic changes for in-progress or future activities shall be submitted to the Engineer for approval before being incorporated into a Contract Progress Schedule. The logic changes must be submitted using a Proposal Schedule or a schedule fragnet submission. Once approved by the Engineer, the Contractor may incorporate the logic in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

For any proposed changes to the original sequence, description or duration of future activities, the Contractor shall submit to the Engineer for approval an explanation of how the proposed description or duration change reflects how the activity will be progressed, including considerations for resources and previously approved production rates. Any description or duration change that does not accurately reflect how the activity will be progressed will not be approved by the Engineer. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule if any Contract Progress Schedule/Monthly Update indicates a failure to meet the Contract Dates.

D. Short-Term Construction Schedule

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a bar chart format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule, and may be at a greater level of detail.

SECTION 722 (Continued)

The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities. Short-Term Construction Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements.

Failure to submit Short-Term Construction Schedules every two (2) weeks may result in withholding of full or partial payments by the Engineer.

722.64 **Impacted Schedule Requirements**

A. Notice of Delay

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within three (3) Calendar Days of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

A Time Entitlement Analysis (TEA) shall consist of a descriptive narrative, prepared in accordance with Subsection 722.62.A - Narratives, and an as-built CPM schedule, which may be in the form of a schedule fragnet (that has been developed from the project's Contract Progress Schedule of Record, and illustrates the impact of a delay to the Critical Path, Contract Milestones and/or Contract Completion Date as required in Subsection 8.10 - Determination and Extension of Contract Time for Completion. TEAs shall also be used to determine the schedule impact of proposed Extra Work Orders (EWO) as also required in Subsection 8.10.

TEAs shall be prepared and submitted in accordance with the requirements of Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements and shall be based on the Contract Progress Schedule of Record applicable at the start of the delay or impact from an EWO. A TEA fragnet must start with a specific new activity describing the work contained in either a Notice of Delay previously submitted to the Department per Subsection 722.64.A - Notice of Delay or an EWO.

SECTION 722 (Continued)

TEAs shall be submitted:

1. as part of any Extra Work Order that may impact Contract Time,
2. with a request for a Time Extension,
3. within fourteen (14) Calendar Days after a request for a TEA by the Engineer for any other reason.

A TEA shall be submitted to the Engineer before any Time Extension is granted to the Contractor. Time Extensions will not be granted unless the TEA accurately reflects an evaluation of all past delays and the actual events that occurred that impacted the Critical Path. The TEA must also demonstrate a plan for the efficient completion of all of the remaining work through an optimized CPM Schedule. The analysis shall include all delays, including Contractor-caused delays, and shall be subdivided into timeframes and causes of delays.

TEAs shall incorporate any proposed activities, logic ties, resource considerations, and activity costs required to most efficiently demonstrate the schedule impacts in addition to detailing all impacts to existing activities, logic ties, the Critical Path, Contract Milestones and the Contract Completion Date. In addition, TEAs shall accurately reflect any changes made to activities, logic ties, restraints and activity costs, necessitated by an Extra Work Order or other schedule impact, for the completion of the remaining work. The Contractor shall provide TEAs that demonstrate that all delays have been mitigated to the fullest extent possible without requiring an Equitable Adjustment to the original bid basis.

All TEAs shall clearly indicate any overtime hours, additional shifts and the resource that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. The Engineer shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions if it is determined to be in the best interest of the Department to do so.

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates.

During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

The Engineer may request that the Contractor prepare a Proposal Schedule or a Recovery Schedule to further mitigate any delays that are shown in the accepted TEA/Contract Progress Schedule.

C. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work. Except as otherwise designated by a Contract Modification, no Contract Progress Schedule that extends performance beyond the Contract Time and/or beyond any Contract Milestone shall be approved by the Engineer. The Contractor shall submit a Recovery Schedule within fourteen (14) Calendar Days of a Contract Progress Schedule submission that shows failure to meet the Contract Dates. This requirement is critical to the Department's ability to make informed decisions regarding Contract Time and costs.

SECTION 722 (Continued)

During the prosecution of the Work, should the Contractor's progress on a critical operation clearly not meet anticipated production, without cause by fault of the Department, or should a critical activity or series of activities not be staffed in accordance with the Contractor's approved Baseline Schedule resource planning, the Contractor shall be obligated to recover such delay. Recovery Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements within fourteen (14) Calendar Days of any of the cases listed above.

Recovery Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in to the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions, without additional compensation for any Contractor delays, if it is determined to be in the best interest of the Department to do so.

During the review of any Recovery Schedule, all Contract Progress Schedules shall continue to be required every month.

The Engineer may request that the Contractor prepare a Recovery Schedule to further mitigate any delays that are shown in an accepted TEA/Contract Progress Schedule.

Changes represented in accepted Recovery Schedules shall be incorporated into the next Contract Progress Schedule.

D. Proposal Schedules

A Proposal Schedule is an alternative schedule used to evaluate proposed changes to the Contract scope or significant alternatives to previously approved approaches to complete the Work, which may include changes to activity durations, logic and sequence. For Types A and B Schedules, the Proposal Schedule shall be cost and resource-loaded.

A Proposal Schedule may be requested by the Department at any time or may be offered by the Contractor. The Engineer may request that the Contractor prepare a Proposal Schedule to further mitigate any delays that are shown in an accepted TEA/Contract Progress Schedule.

The Contractor shall submit the Proposal Schedule within thirty (30) Calendar Days of a request from the Department.

The Proposal Schedule shall not be considered a Schedule of Record until the logic, durations, narrative and basis of the Proposal Schedule have been accepted by the Engineer. If the Proposal Schedule took the form of a fragnet, it must be incorporated into the Contract Progress Schedule of Record showing the current progress of all other activities and the impacts/results of the changes made by the Proposal Schedule before the Proposal Schedule is accepted by the Department.

Proposal Schedules shall clearly indicate any proposed overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts.

Changes represented in accepted Proposal Schedules shall be incorporated into the next Contract Progress Schedule. During the review of any Proposal Schedule, all Contract Progress Schedules shall continue to be required every month.

SECTION 722 (Continued)

E. Disputes (Types A, B, C and D)

All schedules shall be submitted, reviewed, dispositioned and accepted in the timely manner specified herein so as to provide the greatest possible benefit to the execution of this Contract.

Any dispute concerning the acceptance of a schedule or any other question of fact arising under this subsection shall be determined by the Engineer. Pending resolution of any dispute, the last schedule accepted by the Engineer will remain the Contract Schedule of Record.

COMPENSATION

722.80 Method of Measurement and Basis of Payment (Types A, B, C and D)

The Special Provisions will specify the fixed-price amount to be paid to the Contractor for the Project Schedule requirements contained herein. Each bidder shall include this lump-sum, fixed-price bid item amount in his/her bid. Failure to do so may be grounds for the rejection of the bid.

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals will be paid for under the fixed price amount.

This fixed price amount is for payment purposes only and is separate from what the Department considers to be the Contractor's General Condition costs. If the Contractor deems it necessary to include additional costs to provide all of the requirements of this section, these additional costs shall be included in the Contractor's overall bid price.

Twenty percent (20%) of this pay item will be paid upon the Engineer's acceptance of the Contractor's Baseline Schedule, prepared and submitted in accordance with Subsection 722.63.A.

The remaining eighty percent (80%) of this pay item will be paid in equal monthly installments distributed across the Contract Duration from Notice to Proceed (NTP) to Contractor Field Completion (CFC), less the 2 months required for the submittal and review of the Baseline Schedule in accordance with the following formula:

$$\text{Monthly Payment} = \frac{\text{Remaining Fixed Price amount (80% of Item 100.)}}{\text{Contract Duration in whole months} - 2 \text{ months}}$$

The timely and accurate submission of the Baseline Schedule is critical to the Contract and the Department's ability to make informed decisions. Only payments under Item 740 - Engineer's Field Office and Item 748 – Mobilization will be made until the Baseline Schedule is accepted by the Engineer.

SECTION 722 (Continued)

No payment for any other pay item will be processed beyond seventy-five (75) Calendar Days from Notice to Proceed (NTP) until the Baseline Schedule is accepted by the Engineer. Until the Engineer's acceptance of the Baseline Schedule, the combined total of all payments made to the Contractor will be limited to an amount no greater than the total price for Item 748 - Mobilization or 3% of the contract price, whichever is less.

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. Late submittal of missed Contract Progress Monthly Updates will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

Failure to submit schedules as and when required may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

Failure to submit schedules that are acceptable to the Engineer may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

The Schedule of Operations pay item will be adjusted to pay for only the actual quantity of schedules that have been submitted in accordance with this section.

The Contractor's failure or refusal to comply with the requirements of this Section shall be reasonable evidence that the Contractor is not prosecuting the Work with due diligence and may result in the withholding of full or partial payments by the Engineer.

Should there be a Time Extension granted to the Contractor, the Engineer may provide an Equitable Adjustment for additional Contract Progress Schedule Updates at intervals directed by the Engineer. Item 100. will be the basis for this Equitable Adjustment.

722.82 Payment Items

100. SCHEDULE OF OPERATIONS - FIXED PRICE \$_____ LUMP SUM

ITEM 100.1**BASE LABOR RATE****HOUR**

The Contractor shall furnish competent artisans, possessing all pertinent licenses and/or certifications, as required by the Engineer, to maintain and repair various components of the bridges. The Contractor shall submit to the Engineer all pertinent licenses and/or certifications for each artisan prior to the commencement of any work.

The payment under this Item will only be for the time spent by artisans only on the project.

Payment for equipment, other than the usual artisan toolbox, will be made under payment for equipment rental as stated elsewhere in these special provisions.

This Item shall only be used to compensate the Contractor for the time that their in-house workforce spends on work orders assigned by the Engineer.

Incidental to this item, vehicles are to be supplied for each artisan. If more than one artisan of a certain type, for example, a carpenter, are working at a work site, the Contractor need only supply the minimum vehicles required to transport the artisans, their equipment, laborers, materials, and supplies. The artisan vehicle(s) shall be capable of transporting materials consistent with the trade. It is the intent under this item for material deliveries to be reimbursable only for bulk items or materials of sufficient quantity as determined by the Engineer. The Contractor shall make his bid with the understanding that ownership and operating costs do not apply and are not reimbursable for the vehicles utilized under the artisan items.

Described below, and included in this item, will be a tool kit for each trade with all incidental tools, special apparel, and any required personal safety equipment and a vehicle for each trade with no additional charge to the Department.

All tools and equipment in artisans' toolboxes shall be in excellent working condition.

Artisans and toolboxes are described below:

勞工

Small hand tools, handheld power tools, chipping hammer, eye shields, gloves, protective clothing, generators as necessary to run the equipment and equipment that is normally used in the trade.

木工

Hammer, framing square, tape measure, pouch, levels, hand saws, power saws, all electric power tools, air tools and generators and compressors as necessary to run the equipment. Saw blades and drill bits are also included.

水泥工

All trowels, floats, Chipping Hammers, Wire Brushes, Trowels, Floats, Reinforcing Tie Wires, Mortar Boards, Jointing Tools and Buckets, mortar board and mixing tub/buckets, and other hand tools as necessary to complete masonry patching work.

ITEM 100.1 (Continued)**Equipment Operator/Backhoe**

Operator shall have all licenses and certifications required by the Commonwealth of Massachusetts for the equipment they will be operating. Operators shall be in possession of their licenses at all times and show it to the Engineer when requested. Typical equipment includes but not limited to a backhoe and front-end loader.

Equipment which does not require a special licenses or certification for its operation shall be considered incidental to the artisan using it.

Method of Measurement

Item 100.1 will be measured for payment by the hour.

The Engineer will calculate total Base Labor Rate hours spent on the project by artisans.

Overtime hours will be paid for work exceeding eight (8) consecutive hours per day or forty (40) hours per week and shall be compensated as specified in this Item.

To calculate the total Base Labor Rate hours, the Engineer will modify hours spent by various artisans on the project using adjustment factor(s) described below:

<u>COMPENSATION FACTORS</u>		
<u>ARTISAN</u>	<u>REGULAR</u>	<u>OVERTIME</u>
LABORER	1.00	1.30
CARPENTER	1.17	1.52
CEMENT MASON	1.35	1.75
EQUIPMENT OPERATOR	1.34	1.74

If an artisan has an apprentice, then that apprentices' compensation factor shall be 80 percent of the artisan's.

The Compensation Factors above will be used to adjust the number of hours a specific artisan will be paid for, per one (1) hour of work.

ITEM 100.1 (Continued)**Example:**

If the time spent on this project by various artisans is:

勞工	8 小時
木工	4 小時
水泥瓦工	6 小時

then the total hours for “Base Labor Rate” will be calculated as follows:

“Artisan A(hrs)” x “Compensation Factor A” +
“Artisan B(hrs)” x “Compensation Factor B” +
“Artisan C(hrs)” x “Compensation Factor C”

8(hr) x 1.00 + 4(hr) x 1.17 + 6(hr) x 1.35 =
8.00(hr) + 4.68(hr) + 8.1(hr) =
20.78 (billable hours)

Basis of Payment

Item 100.1, Base Labor Rate, will be paid for at the Contract unit price per Hour, which price shall include all equipment and tools required to perform the normal artisan’s work. All clothing or safety equipment normally associated with the artisan’s work is incidental to this item.

Any transportation required for an artisan and their toolbox to travel to and from a job site will be incidental to the work. Ownership and operating costs, fuel and maintenance are not reimbursable for the vehicles and tools utilized under the artisan items.

ITEM 107.855**PRESSURE INJECTION OF CRACKS****FOOT**

The work shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

The work to be done under this Item involves the repair of cracks, as may be required, in the existing concrete substructure at locations designated by the Engineer in the contract plans.

The Engineer shall verify in the field which cracks shall be repaired by the pressure injection. The Contractor shall provide the Engineer clear access to facilitate the inspection. Generally, anticipated locations for this type of repair include various locations throughout the concrete barrier, abutment back walls, abutment bearing seat, pier column, and pier bent caps. Cracks designated for repair by pressure injection shall be bonded by penetration with an epoxy adhesive in accordance with the epoxy manufacturer's recommendations and the following:

The Contractor shall submit for review and approval, all the manufacturer's literature completely describing products. The materials shall be delivered clearly marked with legible and intact labels containing the manufacturer's name, brand name and identification of the contents of containers. The materials shall be stored in areas where temperatures conform to manufacturer's recommendations and instructions.

The Contractor shall comply with the manufacturer's instructions and recommendations regarding safety, mixing, surface preparation, application, etc. The surrounding work, vehicles, planting materials and items of similar nature, shall be protected from damage by epoxy injection materials and operations.

Work under this item shall not be performed when the ambient or concrete temperature is expected to fall below 50° F during the work or for 24 hours following the completion of the work.

Materials

Pressure injection products and manufacturers may be found on the MassDOT Qualified Construction Materials List and the following:

Product Name	Manufacturer/Supplier
Denepox I-40	Grace Construction Products
Sikadur 52	Sika Corp.
MasterInject1500	BASF
An approved equal.	

Equipment For Metering, Mixing, and Injecting

Type: The equipment used to meter and mix the two injection adhesive components and inject the mixed adhesive into the crack shall be portable, positive displacement type pumps with interlock to provide positive ratio control of exact proportions of the two components at the nozzle. The pumps shall be electric, or air powered and shall provide in-line mixing and metering system and shall contain drain-back plugs.

ITEM 107.855 (Continued)

Discharge Pressure: The injection equipment shall have the capability of discharging the mixed adhesive at pressures up to 200 psi and maintaining that pressure.

Ratio Tolerance: The equipment shall have the capability of maintaining the mix ratio for the injection adhesive prescribed by the manufacturer of the adhesive within a tolerance of plus or minus five percent by volume at any discharge pressure up to 200 psi.

The Contractor shall verify that cracks and adjacent surfaces are dry or damp, and free of standing water, dirt, dust, paint, grease, oil, rust, efflorescence, or other foreign matter which would interfere with adhesion of epoxy materials or would otherwise be detrimental to the application of epoxy injection surface seal system.

Application**A. Application of Surface Seal**

1. Seal cracks to be injected with surface sealer material in such a manner that minimal defacing or discoloration of concrete surfaces shall result.
2. Provide entry ports in surface seals spaced at intervals not less than the concrete thickness at that location but provide additional entry ports spaced as required to accomplish travel of injected material between ports and fill cracks completely with epoxy.

B. Epoxy Injection

1. Inject epoxy under constant pressure in accordance with procedures as recommended by manufacturer or as required to obtain 100 percent penetration of cracks without inclusion of air pockets or voids in epoxy and as required to achieve structural bonding.

2. Begin injection of epoxy at lower entry port and continue until there is an appearance of epoxy at entry port directly adjacent to or above entry port being pumped, thus indicating epoxy travel.

3. When epoxy travel is indicated, discontinue injection on entry port being pumped, seal it, and transfer epoxy injection to next adjacent port.

4. Perform epoxy injection continuously until cracks are completely filled.

5. Finishing Requirements:

- (a) When cracks are completely filled, cure epoxy for sufficient time to allow removal of surface seal without any draining or runback of epoxy material from cracks.

- (b) Remove surface seals and clean concrete surfaces as required to produce a workmanlike finish.

6. Filling of Field Control Testing Core Holes

This procedure consists of using two-component bonding agent applied to surfaces of cored holes followed by application of grout mix placed by hand trowel, thoroughly rodded and tamped in place, and finished to match finish and texture of existing concrete to the satisfaction of the Engineer. Submit materials and procedures required to the Engineer for acceptance before proceeding with the work.

ITEM 107.855 (Continued)

Field Quality Control

The Contractor shall provide at least one 4-inch diameter core at a location designated by the Engineer. The Engineer shall reserve the right to order two additional cores at locations he/she designates. The cores shall penetrate the full crack depth of the area being restored. The cores shall be submitted to the Engineer for testing. The tests shall be considered acceptable if, upon visual examination, the injection has achieved 90 percent penetration of the crack, and the bond strength has conformed to the following:

Concrete failure before adhesive failure, or 6500 psi with no failure of either concrete or adhesive.

If a test fails, an evaluation of the methods and materials used must be made before the area represented by the failed test is reinjected and retested. The Contractor will not be permitted to continue injecting cracks until the cause of the failure is determined and the Engineer is satisfied that corrective measures have been taken to prevent additional failures. The Contractor shall make such additional cores as necessary until the work is considered acceptable. The Contractor shall furnish notarized certification that all materials conform to the above requirements.

Method of Measurement

Item 107.855 will be measured for payment by the Foot of crack repairs, complete in place.

Basis of Payment

Item 107.855 will be paid for at the Contract unit price per Foot. This price shall include all labor, tools, sawcutting, equipment, and incidentals required to complete the work.

ITEM 127.12

REINFORCED CONCRETE SUBSTRUCTURE EXCAVATION

CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsection 120 of the Standard Specifications and the following:

The work under this Item consists of the removal and disposal of all deteriorated, spalled, and scaled concrete as required to repair the existing concrete substructure elements to the general lines identified on the drawings and as required by the Engineer.

During the prosecution of work, the Engineer may reject the use of any method or equipment which causes undue vibration or possible damage to the structure or any part thereof. Pneumatic hammers heavier than the nominal 25 pounds mass shall not be used unless approved by the Engineer.

Minimum depth of excavation to sound concrete shall be one inch (1") beyond the inner most layer of reinforcing steel, but not less than four inches (4") from the original surface.

The Contractor shall stop excavating deteriorated concrete when the depth of excavation reaches six inches (6") and shall notify the Engineer immediately.

ITEM 127.1 (Continued)

The edges of the patch shall be cut to neat lines by saw cutting or by methods approved by the Engineer, and the patch areas shall be made rectangular in shape, if possible, with horizontal and vertical edges and avoid over cutting square corners.

The Contractor shall limit extent of excavation of the pier caps and columns as shown on the repair sequence contract drawings.

If the Contractor exceeds the limits of excavation as shown on the repair sequence contract drawings, then temporary shoring shall be installed to alleviate loading on the substructure, at no additional cost to the Department.

The Contractor may submit an alternate method of reinforced concrete excavation to be approved by the Engineer. The alternate method, if approved by the Engineer, shall not incur any additional costs to the Department, and Item 127.12

Item 127.12 will be paid at the contract unit price regardless of the method used to complete the work.

The Contractor shall take all precautions necessary so as not to damage those portions of the bridge including reinforcing steel that are to remain. This includes determining the concrete cover to the steel bars at the edge of each patch prior to excavating concrete. Any steel that is unsuitable for further use through no fault of the Contractor shall be replaced under Item 910.1.

Reinforcement for Structures – Epoxy Coated

All reinforcing steel that is loose shall be tied tightly together using epoxy coated wire ties.

Also, included under this Item are all costs in connection with the cleaning, cutting, and bending of the existing reinforcing steel designated to be retained in the proposed repair. Immediately before preparation for placement of new concrete, the exposed reinforcing steel and concrete area to be patched shall be free of all oil, grease, rust, or other foreign materials. These materials shall be removed by abrasive blasting or other methods approved by the Engineer.

Disposal of Excavated Materials and Site Cleaning

Surplus materials obtained from reinforced concrete excavation and not needed for further use, as determined by the Engineer, shall become the property of the Contractor and shall be properly disposed of by the Contractor outside the location at no additional compensation.

The Contractor is required to broom clean all work site areas after the removal of excavated debris regardless of preexisting conditions. This includes areas under the excavated repair area such as at riverbed, riverbank, or revetment areas. Removal of debris, site cleaning, and disposal of debris are incidental to the Contract and no additional payment will be made.

ITEM 127.1 (Continued)**Method of Measurement**

Item 127.12 will be measured for payment at the Contract unit price per Cubic Yard of substructure concrete excavated, removed, and properly disposed of off site.

Basis of Payment

Item 127.12 will be paid for at the Contract price per Cubic Yard, which shall include all labor, tools, equipment, sawcutting, and incidental costs required to complete the work, and final disposal of the excavated material, and incidentals required to complete the work.

ITEM 127.14**REINFORCED CONCRETE
SUPERSTRUCTURE EXCAVATION****CUBIC YARD**

The work under this Item shall conform to the relevant provisions of Subsections 120 and 482 of the Standard Specifications and the following:

The work includes full and/or partial depth removal and satisfactory disposal of all disintegrated or otherwise unsatisfactory reinforced concrete from the bridge deck.

Prior to excavation, the Contractor shall cover all drainage structures that may be affected by the work. The structures shall remain covered until the new concrete has set, and the area has been cleaned.

The Contractor shall take all precautions necessary so as not to damage that portion of the deck which is to remain. Any steel damaged or otherwise made unsatisfactory for continued use, by the

Any steel that is unsuitable for further use through no fault of the Contractor's operations shall be replaced under Item 910.1. Any steel damaged by the Contractor's work shall be replaced at the Contractor's expense. All reinforcing steel that is loose shall be tied tightly together using wire ties.

The edges of all areas where concrete is removed under Item 127.14 shall be cut to neat lines by saw cutting or by methods approved by the Engineer, to a depth of 1 inch, and all costs in connection with such work shall be incidental to Item 127.14. Patch areas shall be made rectangular in shape [as much as possible], with horizontal and vertical edges and square corners.

In case the reinforcing bars are exposed, the minimum depth of all cement concrete areas to be excavated shall be one (1) inch below the bottom of the top layer of longitudinal reinforcing steel throughout the entire excavated area. No concrete shall be placed until approval of the Engineer is given.

ITEM 127.14 (Continued)

Surface preparation and concrete removal equipment shall be of the following types:

Pneumatic and Power-Driven Chipping Hammers: In no event shall any pneumatic or power hammer weighing in excess of twenty-five (25) pounds be used for the removal of concrete. The Contractor will be restricted to fifteen (15) pound chipping hammers when work involves repairs to slabs of prestressed concrete adjacent deck or box beams, or when removing concrete from below any reinforcing bar.

Abrasive Blasting Equipment: Abrasive blasting equipment shall be capable of removing rust and old concrete from exposed reinforcing steel when deemed necessary by the Engineer.

During the prosecution of this work, the Engineer may reject the use of any method or equipment which causes undue vibration or possible damage to the structure or any part thereof.

Bobcats/Skid Steers will be allowed only to collect debris from the deck surface and will not be allowed to remove concrete from the patch area. All concrete debris shall be removed by hand or by using hand tools. The smaller pieces may be blown out using an oil free compressed air after first being wetted with water to control airborne particulates.

Also, included under these Items are all costs in connection with the cleaning, cutting, and bending of the existing reinforcing steel designated to be retained in the proposed construction. Any existing reinforcing steel damaged or otherwise made unsatisfactory for continued use as a result of the Contractor's operations shall be replaced at the Contractor's expense. All reinforcing steel with active rusting encountered in the excavation shall be thoroughly cleaned by abrasive blasting and coated with a zinc-rich primer conforming to MassDOT Spec. No. M7.04.11 or as required by the Engineer. Any reinforcing steel that is unsuitable for further use through no fault of the Contractor shall be replaced under Item 910.1. All reinforcing steel that is loose shall be tied tightly together using wire ties. Ties are required at every other intersection of transverse and longitudinal reinforcing.

Temporary Protective Shielding must be used on bridges over the roadway, railroad, or waterway during full depth excavation and when, in the opinion of the Engineer, there is the possibility of dislodging concrete from the bottom of the deck.

Immediately before placement of new concrete, the exposed area to be patched shall be free of foreign materials. These materials shall be removed by abrasive blasting and by use of oil free compressed air. No grease, dust, rust, or laitance will be allowed to remain on reinforcing steel and exposed concrete surfaces.

The Contractor shall take all measures necessary to protect pedestrian, vehicular traffic, waterway, or railroad below from the construction operations. No debris, tools or incidental equipment of any kind will be permitted to fall into areas where vehicular or pedestrian traffic exists. Any material that accidentally falls into such areas shall be removed immediately.

ITEM 127.14 (Continued)

All excavated materials shall become the property of the Contractor and shall be removed from the job site.

Method of Measurement

Item 127.14 will be measured for payment by the Cubic Yard, complete in place.

Basis Of Payment

Item 127.14 will be paid for at the contract unit price per Cubic Yard. This price shall include all labor, materials, equipment, sawcutting, abrasive blasting, priming, temporary protective shielding, and incidentals to complete the work. The quantity paid for this Item shall be the actual volume excavated to be removed and properly disposed according to all city, town, State and Federal rules, regulations, and requirements and as required by the Engineer.

Pavement removal at the bridge joints will be paid for under Item 451.

ITEM 226.37**CLEANING BRIDGE SEATS****FOOT**

The work under this item shall conform the relevant provisions of Subsection 120 of the Standard Specifications and the following:

The work includes cleaning abutments and pier caps. All contaminated surfaces to be cleaned shall be cleaned to remove all oil, grease, dirt, salt, and bird guano. Loose mill scale, loose rust, and loose paint shall also be removed from all bearings and structural steel located within five (5) feet of the bearing.

The Contractor shall lay out areas to be cleaned, limiting their activities to one location and confine this operation only to a point where the work can be completed within the same shift.

Note: Lead paint and pigeon waste are considered hazardous waste materials. These materials shall be disposed of in accordance with all Federal, State, and Local environmental requirements and in accordance with Subsection 961 of the Standard Specifications.

If, in the opinion of the Engineer, certain areas have insufficient light for proper cleaning operations, then the Contractor shall furnish and erect temporary flood lights to create a minimum of 30-foot candles on a work surface area. Electrical power shall be supplied by the Contractor. If necessary, scaffolding, ladders, or staging, shall be provided, or rearranged, to afford complete inspection by the Engineer.

Cleaning Bridge Seats at Abutments and Pier Caps

The horizontal surfaces of the abutments and pier caps shall be cleaned of all debris, which may include sand, gravel, lead paint chips, bituminous material, and guano. These materials shall be removed and disposed of away from the job site. Where bridge work will take place over water, the Contractor shall take all precautions necessary so as not to have any guano or other debris fall into the water below.

ITEM 226.37 (Continued)

After the debris has been removed, the Contractor shall pressure wash the horizontal surfaces of the abutments and pier caps in accordance with these special provisions. The Contractor shall also pressure wash all surfaces of the superstructure and substructure elements that are directly above the pier caps and abutments, such as steel/ concrete beam ends, concrete end diaphragms, and abutment backwall. Cleaning of the superstructure surfaces shall be so programmed that dust and other contaminants from the cleaning process will not contaminate wet, newly cleaned surfaces.

Methods of Cleaning

Cleaning operations shall be accomplished by hand scrapers and pressure washing in accordance with these special provisions.

All dirt, oil, grease, tar, road salt, guano or other foreign material which has accumulated on surfaces shall be removed with a pressure washing equipment, which shall be the final phase of cleaning. Containment during pressure washing operations shall also include use of a micro-net type filter to screen all debris which is washed from the structure.

The Public shall be notified that pressure washing operations are being conducted. The Contractor shall be solely responsible for damages arising from the pressure washing operations.

The Contractor shall use non phosphate, non-polluting detergent, acceptable to the Department, that will clean the surfaces in a satisfactory manner. It is estimated that 0.5% by weight of cleaning compound at the nozzle is sufficient. Concentrations above 0.75% could possibly remove sound paint, which, if utilized, shall require remedial work to be accomplished at the expense of the Contractor.

Once pressure washing work is underway, the Contractor shall change or adjust the compound or percentage of each to attain a clean surface properly prepared, without damage to any sound paint.

The Contractor shall be responsible for proper cleaning procedures, with the following serving only as a guideline to consider:

The operator should hold the face of the nozzle within six (6) inches of all surfaces and tilt it slightly in the direction of travel. The surface should first be wetted to allow the cleaning compound to loosen foreign matter which is later removed by a cleaning pass. The time interval between wetting and cleaning should be regulated according to the degree of dirt accumulations, but usually it is sufficient to go twice over an area that is conveniently reached from one position. The speed of pass over an area is comparable to that used in spray painting.

ITEM 226.37 (Continued)

A properly cleaned surface will feel firm and somewhat tacky, but it should not be slick or grimy to the touch. In 90% of the cases, the areas that are properly cleaned can be verified by sight.

Excessive deposits of cleaning liquids remaining on surfaces that will not drain shall be flushed off with clean, fresh water without detergent. In as much as a certain amount of liquid will remain on horizontal surfaces after cleaning, the cleaning program should be followed through from top to bottom systematically. The last pass on any surface should be made with clean fresh water without detergent to remove surplus solution.

Method of Measurement

Item 226.37 will be measured for payment by the Foot, as measured horizontally along the centerline of pier or along the centerline of bearing at abutment, between the outer limits of the pier cap and/or abutment bridge seat. For pier caps with two lines of bearings, the Contractor shall be responsible for cleaning each side of the pier and each side will have its own independent measurement.

Basis of Payment

Item 226.37 will be paid for at the contract unit price per Foot, which price shall include all labor, materials, equipment, containment of debris, lighting of work areas, pressure washing bridge deck joint openings, legal disposal of all waste and all other incidentals required to complete the work.

Cleaning of superstructure and substructure elements located directly above the beam seat being cleaned will be paid for under Item 226.37.

ITEM 451.**HMA FOR PATCHING****TON**

The work under this item shall conform to the relevant provisions of Subsection 450 of the Standard Specifications and the following:

The work includes the removal of the existing pavement at the approaches for replacement of the protective course, as shown on the contract plans.

Method of Measurement

Item 451. will be measured for payment per Subsection 450.90.

Basis of Payment

Item 451. will be paid for per Subsection 450.91.

ITEM 482.2**HOT Poured JOINT SEALER****FOOT**

The work under this Item includes removing and replacing the existing deteriorated seal (hot poured) at the median slab at location shown on the plans. Refer to Sheet 2 of 28 of the Contract Plans.

Sealing the transverse bridge joints at the abutments shall be paid for under Item 482.31.

Removal of the existing joint sealant is incidental to this item. Removing the sealant shall be performed using methods that will not damage the underlying preformed filler or backer rod. The backing to be repaired as required to restrict the flow of the sealant and all costs associated with the repair shall be considered incidental to this item.

After the original seal has been removed, the Contractor shall clean the groove of any dust and debris with an oil free air blast. The groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a hot-applied bituminous crack sealer meeting the requirements of M3.05.4 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

Method of Measurement

Item 482.2 will be measured for payment by the Foot, of the actual number of feet of kerf sawed and sealed in the asphalt pavement surface, complete in place.

Basis of Pavement

Item 482.2 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and incidentals required to complete the work.

ITEM 482.31**SAWING AND SEALING JOINTS IN ASPHALT
PAVEMENT AT BRIDGES****FOOT**

The work to be done under this Item consists of making a sealed kerf across the full width of the finished asphalt pavement at bridge abutments where called for on the Plans. The shape, width, and depth of the kerf shall be as shown on the Plans.

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

ITEM 482.31 (Continued)

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape as shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a hot-applied bituminous crack sealer meeting the requirements of M3.05.4 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

Method of Measurement

Item 482.31 will be measured for payment by the Foot, of the actual number of feet of kerf sawed and sealed in the asphalt pavement surface, complete in place.

Basis of Payment

Item 482.31 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 698.4**GEOTEXTILE FABRIC FOR
PERMANENT EROSION CONTROL****SQUARE YARD**

The work under this item shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following: The work under this item shall consist of furnishing and installing geotextile fabric below the crushed stone placed at the abutment slope paving repairs and median apron as shown on the plans.

The Geotextile Fabric for Permanent Erosion Control shall conform to the material specification M9.50.0 Geotextile Fabrics in the Standard Specifications. Geotextile shall be selected from the MassDOT Qualified Construction Materials List.

Fabric shall be placed in intimate contact with the existing ground and crushed stone. Seams shall be overlapped by at least two feet. If the Contractor elects to sew seams instead of overlap, colored thread must be used. The Contractor shall take care not to allow more than two weeks of exposure to direct sunlight. Fabric rolls shall not be dropped more than two feet.

ITEM 698.4 (Continued)

For seams which are sewn in the field, the Contractor shall provide at least a 6 foot length of sewn seam for sampling by the Engineer before the geotextile is installed.

Method of Measurement

Item 698.4 will be measured for payment by the Square Yard, complete in place. The quantity to be paid for shall be the plan area in square yards covered with no allowance for overlapping.

Basis of Payment

Item 698.4 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, equipment, sewing and/or overlapping material, and incidentals required to complete the work.

ITEM 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

The work under this Item shall conform to the relevant provisions of Subsection 740 of the Standard Specifications and the following:

Two computer systems and printer system meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

The Computer System shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio recording:	the computer system shall be capable of allow video calling and
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates

ITEM 740. (Continued)

Applications: Latest MS Office Professional with all security updates
Latest Adobe Acrobat Professional with all security updates
Latest Autodesk AutoCAD LT
Antivirus software with all current security updates maintained through the life of the contract.

Monitors: Two 27" LED with Full HD resolution.
Max. resolution 1920 x 1080

Flash drives: 2 (two) - 128GB USB 3.0
Internet access: High Speed (min. 24 mbps) internet access with wireless router.

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (RADF) (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as required by the Engineer.

ITEM 853.8 TEMPORARY ILLUMINATION FOR WORK ZONE DAY

The work under this Item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The work under this Item shall include furnishing, deploying and maintaining in proper operating condition a LED balloon diffuser lighting system. These portable light towers shall be used throughout the project area for temporary work zone lighting. The use of unshielded high wattage flood lights shall not be permitted.

These towers shall be used, relocated and adjusted to meet the criteria in Subsection 850 of the Standard Specifications and the following:

The Contractor shall illuminate the following work zone areas:

- Change in direction (i.e., work zone entrances and exits, crossovers, etc.)
- Tapered areas.
- Actual area where the construction is being performed.

Light measurement shall be based on the illuminance method and the lighting levels shall be based on the classification of construction activity that is taking place. At no time shall the light level be below 5 fc and the uniformity shall not exceed 6:1. Task Classifications and recommended illumination levels are shown in Table 1.

TABLE 1
 TASK CLASSIFICATIONS AND ILLUMINATION LEVELS

Task Classifications	Illumination Level	Average Minimum Maintained Illuminance
All work operations areas, setup of lane or road closures, lane closure tapers, and flagging stations such as Excavation (all types), Embankment Fill and Compaction, Reworking Shoulders, Asphalt Pavement Rolling, Subgrade, Stabilization and Construction, Base Course Rolling, Sweeping, Cleaning and Landscaping.	Level I	5 foot-candles
Areas on or around construction equipment; asphalt paving, milling, and concrete placement and/or removal such as Milling, Removal of Pavement, Asphalt Paving and Resurfacing, Concrete Pavement, Waterproofing and Sealing, Sidewalk Construction, Base Course Grading and Shaping, Surface Treatment, Bridge Decks, Drainage Structures and Drainage Piping, Other Concrete Structures, Barrier Wall and Traffic Separators, Guardrails and Fencing, Striping and Pavement Markings, Repair of Concrete Pavement, Highway Signs, Hole Filling and Repair of Guardrails and Fencing.	Level II	10 foot-candles
Pavement or structural crack/ pothole filling; joint repair, pavement patching and/or repairs, installation of signal/electrical/mechanical equipment such as Traffic Signals, Highway Lighting Systems and Crack Filling	Level III	20 foot-candles

ITEM 853.8 (Continued)

Prior to commencement of work the Contractor shall submit to MassDOT for approval a description of illumination equipment that is proposed to be used on this project and shall include photometrics that detail the light levels that are to be provided for the particular operation for the type of equipment, level of luminance, and height to be installed.

Any potential glare from the lighting system should be considered from each direction and on all approaching roadways and opposing lanes of traffic. Glare from the illumination system should be minimized as much as possible for both workers and motorists in adjacent active travel lanes. If necessary, the Contractor shall provide supplemental hardware such as visors, louvers, shields, glare screen and barrier, to reduce glare in adjacent active travel lanes.

Equipment mounted lighting may be used to supplement light towers to achieve the required lighting levels for the activity involved per Table 1.

Method of Measurement

Item 853.8 will be paid for at the contract unit price per Day per Subsection 850.80.

Basis of Payment

Item 853.8 will be paid for at the contract unit price per Day. This cost shall include all labor, materials, equipment, tools and all incidentals required for the design and installation of the work zone lighting. This price shall include lighting, submission preparation, wiring connections, equipment relocations, and include all material and labor incidental for a complete, functional and operational work zone illumination system.

The price of this item shall include the material and labor necessary to install any supplemental hardware required to reduce glare on all adjacent active travel lanes.

The per day (up to 24 hours) price shall be full compensation for all "Temporary Illumination for Work Zone" regardless of the number of concurrent work areas, amount of equipment concurrently in use or the durations of or changes of the work shifts per day.

Furnishing, installing, resetting, modifying and removing equipment for work zone illumination shall be incidental to Item 853.8.

ITEM 859.1**REFLECTORIZED DRUMS WITH SEQUENTIAL
FLASHING WARNING LIGHTS****DAY**

The work under this Item shall conform the relevant provisions of Subsection 850 of the Standard Specifications and the following:

Work under this item consists of furnishing, installing, maintaining proper operating conditions, and removing reflectorized drums, and any necessary ballast, equipped with sequential flashing warning lights.

Materials

Reflectorized drums shall be listed on the MassDOT Qualified Traffic Control Equipment List. Reflective sheeting on drums shall meet or exceed ASTM D4956 Type VIII. All drums shall be maintained in a satisfactory manner including the removal of oils, dirt, and debris that may cause reduced retroreflectivity.

The Contractor shall use one of the following sequential flashing warning light systems unless otherwise approved by the Engineer:

1. Empco-Lite LWCSD.
2. pi-Lit® Sequential Barricade-Style Lamp; or
3. Unipart Dorman SynchroGUIDE.

Sequential flashing warning lights shall be secured to reflectorized drums per the light manufacturer's specifications.

Construction Methods

The first ten (10) drums in any merging or shifting taper as designated in the Temporary Traffic Control Plan shall be equipped with sequential flashing warning lights. These lights shall be operating, at a minimum, between dusk and dawn when the taper is deployed.

The successive flashing of the sequential warning lights shall occur from the upstream end of the merging or shifting taper to the downstream end of the taper in order to identify the desired vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55, nor more than 75 times per minute.

Warning lights shall be powered off when drums are not deployed in a taper.

Method of Measurement

A group of ten (10) reflectorized drums with sequential flashing warning lights is considered one (1) unit and will be measured by the day. Each period of up to 24 hours during which this unit is in use will be measured as one day regardless of the number of times that the drums are positioned, repositioned, removed, or returned to service.

Basis of Payment

Reflectorized Drums with Sequential Flashing Warning Lights will be paid for at the contract unit price per day, which shall include full compensation for furnishing, positioning, repositioning, and removing the group of ten (10) drums as required by the Engineer.

ITEM 905.**4000 PSI, 3/8 INCH, 660 CEMENT CONCRETE****CUBIC YARD**

The Work under this Item shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and placing 4000 PSI, 3/8 INCH, 660 Cement Concrete.

This item shall be used for all Substructure Repair patching after all deteriorated and/or unsound concrete is removed under Item 127.12.

The Engineer shall determine whether to use this Item or to direct the use of a Hi-Early mix. All cost(s) associated with the addition of any approved admixture to the cement concrete shall be incidental to Item 905.

The Contractor shall obtain approval from the Engineer for all formwork that shall be required prior to placement of any concrete.

All formwork placed under this item must be removed no later than forty-five (45) days after the repair is completed. Failure to remove the formwork within forty-five (45) days may result in its removal by others, with the associated costs being assessed to the Contractor.

Preparation of Concrete Surfaces

All concrete surfaces to be patched shall be roughened, cleaned of all laitance, dirt, grease, oil, other contaminants and all standing water. All reinforcing steel encountered in the excavation shall be thoroughly cleaned by abrasive blasting and coated with a zinc-rich primer conforming to MassDOT Standard Specification M7.04.11 before being covered with new concrete.

The excavated areas shall then be coated with an Epoxy Bonding Compound, see Item 964.1. At the discretion of the Engineer, epoxy bonding compound may be omitted in favor of a thorough application of water for a minimum of 10 minutes. Any remaining water should be blown out to produce a saturated surface dry (SSD) condition using oil free compressed air.

Method of Measurement

Item 905. will be measured for payment by the Cubic Yard of concrete furnished and installed, complete in place.

Basis of Payment

Item 905. will be paid for at the Contract unit price per Cubic Yard, complete in place, which price shall include full compensation for materials, tools, equipment, labor, oversight services and all incidentals necessary to complete this Item as specified herein to the satisfaction of the Engineer, including the installation and subsequent removal of any formwork, and coating of the reinforcing steel.

The use of Hi-Early concrete as required by the Engineer, shall be incidental to this Item.

ITEM 905.01**4000 PSI, 3/8 INCH, 660 CEMENT CONCRETE****CUBIC YARD**

The Work under this Item shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and placing 4000 PSI, 3/8 INCH, 660 Cement Concrete.

This item shall be used for completing the slope paving repairs at the east abutment.

The Engineer shall determine whether to use this Item or to direct the use of a Hi-Early mix. All cost(s) associated with the addition of any approved admixture to the cement concrete shall be considered incidental to this Item.

All formwork placed under this item must be removed no later than forty-five (45) days after the repair is completed. Failure to remove the formwork within forty-five (45) days may result in its removal by others, with the associated costs being assessed to the Contractor.

Due to difficult access to this location, the contractor is allowed to use a pumpable mix to facilitate construction of the Slope Paving repairs.

Method of Measurement

Item 905.01 will be measured for payment by the Cubic Yard of concrete furnished and installed, complete in place.

Basis of Payment

Item 905.01 will be paid for at the Contract unit price per Cubic Yard, complete in place, which price shall include full compensation for materials, tools, equipment, labor, oversight services, installation and subsequent removal of any formwork, and coating of the reinforcing steel, and all incidentals required to complete the work.

ITEM 908.11 EXPOSED CONCRETE BRIDGE DECK SEALING SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsection 965 of the Standard Specifications and the furnishing and installing Sealant using high molecular weight methacrylate in accordance with the contract documents and as directed by the Engineer.

The High Molecular Weight Methacrylate (HMWM) resin shall be low viscosity and non-fuming.

Acceptance is based on the manufacturer certifying that it conforms to the following, and the contractor submitting the certifications to the Department:

Viscosity	Less than 25 cps when measured according to ASTM D2849
Density	Greater than 62.4 pcf at 77° F
Flash Point	Greater than 200° F
Vapor Pressure	Less than 0.039 inch Hg @ 77° F (ASTM D323)
TG (DSC)	Greater than 136° F (ASTM D3418)
Gel Time	Greater than 40 minutes for a 3.5 ounce mass
Percent Solids	Greater than 90% by weight
Bond Strength	Greater than 1.5 ksi (ASTM C882)

Sand shall be commercial quality dry blast sand. 95% of the sand shall pass the 0.0937 inch (No. 8) sieve, and 95% shall be retained on the 0.0234 inch (No. 30) sieve.

The container shall include the following information:

Name of the manufacturer
Brand name of the product
Date of manufacture

The Contractor shall clean the Portland cement concrete bridge deck surface as shown on the plans and as specified in these special provisions.

The deck surface shall be cleaned by abrasive blasting and shall be dry when blast cleaning is performed.

Traffic stripes, pavement markings, and pavement markers shall be removed as specified in these special provisions during the process of cleaning the deck.

After abrasive cleaning, loose material shall be blown from visible cracks using high pressure air, and the entire deck surface shall be cleaned by manual or power sweeping.

Equipment shall be fitted with suitable traps, filters, drip pans, or other devices as necessary to prevent oil or other deleterious material from being deposited on the deck.

ITEM 908.11 (Continued)

If the surface becomes contaminated at any time prior to placing the penetrating sealer, then the affected surface shall be cleaned by abrasive blasting followed by manual or power sweeping.

The Contractor shall apply methacrylate resin only to the specified area. Joints and drainage facilities shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense.

The Contractor shall not apply sealers if rain is expected within 12 hours of completion. Sealers shall be applied to clean, dry surfaces when the surface temperature is at least 50° F, and if near 50° F, rising. The sealer shall be mixed and applied according to the manufacturer's instructions and no more than 2.5 gallons at a time. Sweep, pour, squeegee, or spray the area to receive the sealers, allowing the sealers to flow into the cracks. If the manufacturer does not recommend an application rate, use 75 to 100 square feet per gallon, as needed. After the resin has been applied, at least 20 minutes shall elapse before applying the sand. The sand shall be broadcast at a rate of approximately 3 ounces per square foot, completely covering the sealer.

Two coats minimum are required on all surfaces to be treated.

Excess unbound sand is to be removed after the resin is tack free and before traffic is permitted to resume.

Method of Measurement

Item 908.11 will be measured for payment by the Square Yard as based on plan dimensions.

Basis of Payment

Item 908.11 will be paid for at the Contract unit price per Square Yard and shall include full compensation for both coats including furnishing all labor, materials (including methacrylate resin), tools, equipment, and incidentals, and for doing all the work involved in the test sealing, cleaning concrete surfaces, and applying treatment material, as shown on the contract drawings, as specified on these special provisions, and as directed by the Engineer.

ITEM 909.2**CEMENTITIOUS MORTAR FOR PATCHING****SQUARE FOOT**

The work under this Item shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

The work includes furnishing and placing a polymer-modified, cementitious, fast setting, trowel grade patching mortar to patch vertical surfaces on the existing structures at areas of spalled, delaminated, or cracked concrete as required by the Engineer.

This Item does not include the repair of any vertical patch that exceeds two (2) inches in depth. The repairs to those patches shall be made using Item 905.

ITEM 909.2 (Continued)

Material

The polymer modified cementitious patching mortar shall conform to the following requirements:

The mortar system shall not contain chlorides, nitrates, added lime, or high silica cements. The system shall be non-combustible, either before or after cure.

<u>TYPICAL PROPERTIES OF CURED MATERIALS</u>	
Finishing Time	20-60 minutes after combining components
Color	Concrete Gray
Abrasion Resistance	6 times that of controlled concrete
Bond Strength	100% concrete substrate failure (Pull off method)
Modulus of Elasticity	4.5×10^6 PSI
Surface Scaling	No Deterioration after 120 cycles (deicing salt solution and freeze/thaw)
Compressive Strength (2 hours, 50% RH)	150 PSI minimum
Compressive Strength (28 days, 50% RH)	5,500 PSI minimum
Flexural Strength (28 days, 50% RH)	1,300 PSI minimum

The system shall conform to the ECA/USPHS Standards for surface contact with potable water. The system shall not produce a vapor barrier. The system shall be thermally compatible with concrete.

Certification

The Contractor shall furnish notarized certification that all materials conform to the above requirements. In addition, samples of all materials proposed for use shall be submitted to the Department's Research and Materials Section. To allow sufficient time for testing, these samples must be submitted at least six weeks prior to scheduled use.

Surface Preparation

The Contractor shall remove all deteriorated and spalled areas as designated by the Engineer. All costs to remove the deteriorated and spalled concrete shall be compensated for under Item 127.12.

The Contractor shall have the approval of the Engineer certifying that all spalled and deteriorated concrete has been removed prior to patching deteriorated areas. If the deterioration of the vertical surfaces is deeper than one (1) inch, then the repair will be made in maximum lifts of one (1) inch deep. The preceding lift shall be allowed to reach final set before applying fresh material. The fresh mortar must be scrubbed into the preceding lift.

ITEM 909.2 (Continued)**Application Methods**

Areas to be patched must be clean and sound. All loose and disintegrated concrete shall be removed by means of abrasive blasting, or an equivalent method, to a depth where sound concrete is exposed. Minimum patch depths at edges of patch shall be sawcut to one half (½) inch in depth. Abrasive

blast existing concrete to remove all contaminants prior to applying mortar. Chipping methods are to be approved in advance by the Engineer.

At the time of application, surfaces should be damp (saturated surface dry) with no glistening water. Mortar must be worked into the substrate filling all pores and voids. Force the material against the edge of the repair, working towards the center. After filling, consolidate, then screed.

The maximum thickness of application in one pass shall be one (1) inch. If the depth of patch exceeds one (1) inch, the mortar shall be placed in two passes of approximate equal thickness, with a total thickness not to exceed two (2) inches. Before the first pass has achieved an initial set, the surface shall be prepared for the second pass by scratching with a trowel to form a grid of deformation on the surface.

Prime and work the mix into the substrate, filling all pores and voids. Avoid puddling of the primer on horizontal substrates.

Curing

Use a fine mist spray of water, wet burlap, or a non-solvent approved curing compound if ambient conditions might cause premature surface drying (high temperature, low humidity, strong winds, etc.). If necessary, protect the newly applied mortar from rain. To prevent freezing, cover with insulating material.

Manufacturer's Field Representative

The Contractor shall arrange with the material's manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures.

The manufacturer's field representative must be fully qualified to instruct artisans or perform the work and shall be subject to the approval of the Engineer.

The Contractor shall be completely responsible for the expense and services of the required field representative, and the bid contract price shall be full compensation for all cost in connection therewith.

Method of Measurement

Item 909.2 will be measured for payment by the Square Foot of patch area, complete in place.

Basis of Payment

Item 909.2 will be paid for at the Contract unit price per Square Foot, which price shall include all labor, materials, equipment, and incidentals required to complete the work.

ITEM 909.3**RAPID SETTING LOW PERMEABILITY DECK
REPAIR CONCRETE****CUBIC YARD**

The Work to be done under this Item shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

The work to be performed under this Item shall consist of the supply, mixing, placement, and curing of rapid setting low permeability deck repair concrete material.

Materials shall be delivered to jobsite in original, unopened, undamaged containers that clearly show the manufacturer's name, product name, and batch number. Material shall be stored in a dry area off the ground protected from rain, snow, and other sources of moisture. Material shall be protected from temperature extremes. Bulk sand and coarse aggregate shall be stored in a well-drained area on a clean, solid surface and materials shall be covered to prevent contamination with foreign matter.

Materials

The rapid setting low permeability cement concrete deck repair material shall comply with the following material and proportioning requirements:

Component	Value
Cement Content	559 Pounds Per Cubic Yard
Fly Ash – Class F (AASHTO M 295)	99 Pounds Per Cubic Yard
Coarse Aggregate 3/8" (AASHTO M 80)	1450 Pounds Per Cubic Yard
Fine Aggregate (ASTM C33)	1600 Pounds Per Cubic Yard
Retarder*	As Directed
Water (AASHTO T 26)	296 Pounds Per Cubic Yard

* An approved retarding admixture may be used to extend the setting time of the concrete when so required by the Engineer at dosage rates recommended by the cement concrete deck repair material manufacturer. Retarding admixture proposed for use must be approved by the Engineer. Only Materials listed on the MassDOT Qualified Construction Materials List may be used.

Aggregates

Fine and coarse aggregate shall meet the requirements of Material Subsection M4.02.00, including but not limited to resistance to Alkali Silica Reactivity (ASR).

Modifications to the cement concrete mix design provided above must be submitted to the Engineer for approval. Testing for the performance criteria shown below shall be performed by an AASHTO accredited laboratory. Trial batch testing shall be witnessed by District and Research and Materials personnel.

The cement concrete must satisfy all performance criteria and trial batch testing requirements to the satisfaction of the Engineer in order to be considered acceptable.

ITEM 909.3 (Continued)

Acceptance of the concrete compressive strength will be based on the field cured cylinders achieving a minimum of 5000 psi at 7 days or earlier as cast and tested by MassDOT. Compressive strength testing of field cured cylinders cast and tested by MassDOT should achieve a minimum compressive strength of 4000 psi at 30 hours as a verification that the mix is on target to achieve the 7-day acceptance requirement.

Surface Preparation

Existing concrete surfaces to be in contact with the proposed deck repair concrete must be free of materials such as paint, oil, curing compound, bond breaker, etc., that will inhibit bonding. Existing concrete surfaces shall be hydroblasted with equipment that can remove asphaltic material, oils, dirt, rubber, curing compounds, paint carbonation, laitance, weak surface mortar and other potentially detrimental materials, which may interfere with the bonding or curing of the proposed deck repair and overlayment concrete. Retained reinforcing steel shall be cleaned by abrasive blasting or other mechanical means to achieve a white metal finish. Deteriorated reinforcement shall be replaced as required by the Engineer.

Existing concrete surfaces must be saturated prior to concrete placement using potable water. Standing water shall be removed from surfaces to achieve a Saturated Surface Dry (SSD) condition.

Mixing

Cement concrete mixes shall be batched using Mobile Concrete (volumetric) mixing equipment. The MassDOT Highway Division will only permit the use of Mobile Concrete Mixers when all of the following procedures are adhered to.

Upon written request by a Contractor, the Deputy Chief Engineer for Construction may approve the use of concrete proportioned by a Mobile Concrete Mixer used for the purpose of mixing rapid setting low permeability deck repair concrete. All cement concrete materials, concrete handling, placement, protection, curing, and finishing requirements of the Standard Specifications for Highways and Bridges shall apply. Mobile Concrete Mixers shall meet all the requirements of ASTM C685 and be currently registered with the Volumetric Mixer Manufacturers Bureau (VMMB).

Each Mobile Concrete Mixer used on MassDOT Highway Division projects shall be pre-qualified as follows: All Mobile Concrete Mixers are required to have a Quality System Manual (QSM) that conforms to the format outlined in AASHTO R-38 and that adequately addresses the information specified in AASHTO R-38. The QSM shall be approved by the Research & Materials Section annually. A copy of the approved QSM shall be kept with the Mobile Concrete Mixer and made available to the Engineer upon request. The Quality Control procedures for concrete production contained in the approved QSM shall be adhered to for all placements.

ITEM 909.3 (Continued)

The concrete mixing and delivery equipment shall be capable of mixing and delivering concrete to the placement location at rates that are sufficient to comply with the project's restrictive time constraints. Cement concrete shall be proportioned and mixed using self-contained, mobile, and continuously mixing equipment that meets the following requirements:

1. Use a self-propelled mixer that can carry sufficient unmixed dry, bulk cement, sand, coarse aggregate, and water to produce at least 6 cubic yards of concrete on site.
2. Use a mixer that is capable of positive measurement of cement introduced into the mix as well as fine and coarse aggregate. Use a recording meter that is always visible and equipped with a ticket printout to indicate the quantity of cement and aggregate materials.
3. Calibrate the mixers to accurately proportion the specified mix. Prior to placing concrete, perform calibration and yield tests under the Engineer's supervision in accordance with the Department's written instructions. Copies of these written instructions are available from the Research & Materials Unit. Perform the calibration and yield tests using the material to be used on the project. Recalibrate the mixer after any major maintenance operation, on the mixer, anytime the source of materials changes, or as directed. Furnish all materials and equipment necessary to perform the calibrations and yield tests.
4. Use a mixer that controls the flow of water into the mix. Measure the flow rate of water with a calibrated flow meter coordinated with both the cement and aggregate feeding mechanisms and the mixer. Adjust the flow rate, as necessary, to control the slump and ensure that the water-cement ratios are met. In addition to flow meters, use mixers with accumulative water meters capable of indicating the number of gallons, to the nearest 0.1 gallon, introduced into the mixer. Filter water with a suitable mesh filter before it flows through the accumulative water meters.
5. Use a mixer that has a minimum of two liquid admixture dispensers and can dispense the admixtures through a controlled flow meter in accordance with ASTM C685.
6. Calibrate the mixer to automatically proportion and blend all components of the indicated composition on a continuous or intermittent basis as the finishing operation requires. Provide a mixer that discharges mixed material through a conventional chute and is capable of spraying water over the placement width as it moves ahead to ensure that the surface to be overlaid is wet prior to receiving the concrete.
7. Mount a tachometer on the unit to indicate the drive shaft speed.

ITEM 909.3 (Continued)

Mix Design Requirements

Performance Criteria	
ASTM C191 Set Time (Mod)	
Initial Set	30 minutes
Final Set	40 minutes
Slump of Concrete	7 to 9 inches
Air Content	3% to 7%
Compressive Strength	
4 hours	2500 psi Minimum
7 days	5000 psi Minimum
Bond Strength (ASTM C882)	
24 hours	1200 psi Minimum
7 days	1900 psi Minimum
28 days	2200 psi Minimum
Chloride Penetration (ASTM C1202)	
90 days	1500 Coulomb Maximum
Shrinkage (ASTM C157)	
28 days	0.04% Maximum
Freeze – Thaw Durability (ASTM C666)	
300 cycles (Durability Factor)	80 Minimum
Unit Weight	150pcf

The concrete mix design shall be mitigated per Subsection M4.02.00. Proposed mix design with data sheets and trial batches shall be submitted to the Research and Materials Section for review and approval. The Engineer shall be notified at least 48 hours prior to the test batching and shall be present to witness the testing.

All tests necessary to demonstrate the adequacy of the concrete mix shall be performed by the Contractor, including, but not limited to: slump, air content, temperature, initial set and final set (AASHTO T197). Compressive strength tests shall be determined on field cured cylinders (6" X 12" cylinders) (a minimum of 9 sets of 2 cylinders=18 total) at 3 hours, 4 hours, 5 hours, 6 hours, 24 hours, approximately 30 hours, 2 days, 3 days, and standard cured cylinders at 7 days, and additional cylinders as needed.

Compressive strength results of Standard and Field cured trial batch cylinders shall meet all the following minimum overdesign strength requirements to be considered acceptable. Compressive strength results shall be the average of two (2) 6" x 12" cylinders:

4-hour cylinders: 3,000 psi
 30-hour cylinders: 5,000 psi
 7-day cylinders: 6,000 psi

ITEM 909.3 (Continued)

Research & Materials Section personnel will witness calibration or verification of equipment and prequalification sampling and testing of concrete ingredients performed for each Mobile Concrete

Mixer

Concrete mix design and trial batches shall be preapproved by the Research & Materials Section.

For any project where a Mobile Concrete Mixer is proposed to be used, the Contractor must prepare and submit a project-specific construction Quality Control Plan (QC Plan.) The QC Plan shall conform to the format and content detailed in the Northeast Transportation Training and Certification Program (NETTCP) Model QC Plan (December 2009, or latest edition). Information contained in relevant sections of the approved QSM for the proposed Mobile Concrete Mixer may be referenced, rather than repeated, in applicable sections of the QC Plan (e.g. Materials Control, Production Facilities.) The QC Plan shall be submitted to the Engineer within 30 days of the Notice to Proceed for the Contract. The District Construction Engineer and the Research & Materials

Section will review the QC Plan. The Contractor shall not place any concrete by Mobile Concrete Mixer prior to approval by the Research & Materials Section.

A signed batch ticket printout from the printer mounted on the Mobile Concrete Mixer truck indicating that the mix batched is in conformance with the mix design previously approved shall also be provided to the Engineer prior to discharging concrete.

Quality Control inspection, sampling and testing, including but not limited to slump, air content, temperature and cylinders for compressive strength, shall be performed by the Contractor in accordance with the approved QC Plan. The Engineer will perform Acceptance sampling (every 50

cubic yards per day per approved truck) and testing for field cured cylinders as well as Acceptance inspection for materials and workmanship attributes.

The use of Item 909.3 is prohibited when the ambient temperature is expected to drop below 40° F within 7 days prior to the anticipated concrete placement. The Engineer may suspend or revoke approval of the Mobile Concrete Mixer at any time the unit fails to produce uniformly mixed concrete within the quality limits specified.

Material to be mixed should have a temperature of about 70°F. Warmer material will set faster than expected and cooler material will have slower strength gain. The temperature of the mixed concrete shall be controlled by protecting the bags of repair material from temperature extremes and by adjusting the temperature of the mixing water.

ITEM 909.3 (Continued)

The coarse aggregate shall be placed in the mixer followed by the mixing water, then the cement. The components shall then be mixed for 2 to 3 minutes to achieve a uniform lump-free consistency. Admixtures not included as part of the approved mix design shall not be added without the approval of the Engineer. The repair concrete shall not be re-tempered. The concrete mixing and delivery equipment shall be capable of mixing and delivering concrete to the placement location at rates that are sufficient to avoid horizontal cold joints between successive placements.

Placement and Finishing

The deck repair concrete shall be placed onto substrates that are Saturated, Surface Dry (SSD). The manufacturer's limitations on minimum surface and ambient temperatures shall be complied with. surfaces that are adjacent to the placement shall be protected with drop cloths, waterproof paper, or other means to maintain them free of material splashes, water, and debris.

The deck repair concrete shall be placed immediately after mixing and shall be worked firmly into sides and bottom of repair area to achieve good bond. The concrete placement shall start at one edge of the excavation and shall continue full depth with temporary vertical bulkheads, if needed, to ensure that horizontal cold joints do not occur between successive concrete placements.

Final finishing shall be performed as soon as possible after placement as there will be little or no bleed water. The finished surface shall be tined to provide a skid resistant finish.

Bridge Deck Vibration

As required by the Engineer and to minimize the effects of vibrations from vehicular traffic passing in adjacent lanes next to each placement, traffic should be slowed along the adjacent travel lanes and the placement of concrete overlay should be executed between the hours of lower traffic volumes, generally between 1:00 AM and 3:00 AM.

Curing

Water curing of the deck repair concrete shall start once the deck repair concrete begins to lose its moist sheen. Wet burlap shall be placed on the deck repair concrete and the burlap shall be kept continuously wet for a 1-hour period after final set. Application of an approved curing compound in lieu of the 1-hour wet burlap cure must be reviewed and approved by the Engineer.

ITEM 909.3 (Continued)**Clean Up**

The mixer shall be cleaned immediately after use or add mix water and begin mixing immediately for the next batch. Buildup of hardened repair material in the mixer shall not be allowed since this creates inefficient mixing and the heat generated accelerates later batches.

Method of Measurement

Item 909.3 will be measured for payment by the Cubic Yard, complete in place.

Basis of Payment

Item 909.3 will be paid at the Contract unit bid price per Cubic Yard which price shall include all labor, materials, tools, equipment, placement and removal of forms, field representative, equipment, and incidentals required to complete the work.

Replacing and installing new reinforcing steel will be paid for under Item 910.1.

ITEM 909.42**SELF CONSOLIDATING CONCRETE
BEAM END REPAIR****EACH**

The work under this item shall conform to the relevant Provisions of Subsection 901 of the Standard Specifications and the following:

The work under this Item includes furnishing and placing galvanized welded wire mesh reinforcement and reinforcing bars, galvanized steel plates and threaded rods, galvanic anodes (puck), and the placing of Self-Consolidating Concrete (SCC) as noted on the plans to encase steel end beams.

The Self-Consolidating Concrete (SCC) product shall be included on the MassDOT Qualified Construction Material List.

Self-consolidating concrete is concrete designed to flow under its own weight, maintain homogeneity and completely fill the formwork, even in the presence of dense reinforcement.

Vibration shall not be used to consolidate the concrete. Internal vibration of self-consolidating concrete is prohibited.

Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17

No concrete shall be placed within the forms until the concrete mix design has been approved. Should a change in source of material be made, the new mix design shall be submitted to the Engineer for review.

ITEM 909.42 (Continued)**Galvanic Anodes**

As part of this work, Galvanic anodes shall be for high corrosive risk application and be made of zinc with an alkaline pH. Galvanic anodes shall be either tied or embedded and installed in accordance with manufacturer's recommendations unless otherwise noted on the Contract Drawings.

Galvanic Anode Placing

Place and secure anodes in position, request inspection prior to concrete placement. Anodes shall be tied to reinforcement or embedded in a compatible mortar. Install anodes in a grid pattern with minimum spacing per manufacturer's recommendations. Test electrical connection between the anode and reinforcing with an appropriate meter prior to installing embedment mortar (if required). A resistivity value of between 0 and 1 ohm shall be achieved. After electrical connection has been confirmed, encapsulate anode with embedment mortar (if required) per manufacturer's instructions. Retest electrical connection after embedment mortar has been installed.

Method of Measurement

Item 909.42 will be measured for payment by the Each end beam repaired furnished and installed, complete in place.

Basis of Payment

Item 909.42 will be paid for at the contract unit price per Each. This price shall include all labor, materials, tools, equipment, removal of all formwork, any required trial batching and acceptance testing including the cost associated with hiring certified technician, and incidentals required to complete the work.

ITEM 910.1**STEEL REINFORCEMENT FOR STRUCTURES -**
EPOXY COATED**POUND**

The work under this Item shall conform to the relevant Provisions of Subsection 901 of the Standard Specifications and the following:

All requirements of Subsection 901.62 Reinforcement shall be adhered to including lapping at splices and ties at every other intersection.

The Contractor may be required to submit for approval, detail plans and schedule of bar reinforcement.

The Contractor will replace reinforcing bars as required by the Engineer.

Any reinforcing steel damaged by the Contractor's operations will be replaced by the Contractor at their own expense.

ITEM 910.1 (Continued)**Method of Measurement**

Item 910.1 will be measured for payment by the actual number of pounds of steel reinforcement bar in place.

Basis of Payment

Item 910.1 will be paid for at the Contract unit price per Pound, which price shall include all labor, materials, tools, equipment, and incidentals required to complete the work.

ITEM 910.4 MECHANICAL REINFORCEMENT BAR SPLICER EACH

The work under this item shall conform to the relevant provisions of Subsection 901 and subsection M8.01.9 of the Standard Specifications and the following:

The work shall include supplying and installing mechanical reinforcing bar splicers where identified in the field.

Mechanical splicers shall be epoxy coated and shall be compatible with epoxy coated reinforcing bars. All material used shall be on the MassDOT's approved product list. Equivalent joining devices may be proposed for use by the Contractor, but they must be submitted to the MassDOT Research and Material Laboratory for testing and approval. The Contractor shall be specifically cautioned that no bridge repair work will be allowed to commence unless and until the mechanical splicers are approved in accordance with MassDOT's materials approval procedures. The Contract time will not be extended to allow for the approval process.

Splicers vary in size; #4 through #11. A mechanical splicer shall match the size of reinforcing bar to which it is lapped or attached. Mechanical splicers may consist of the two-piece assembly for use when joining bars across a phase line or construction joint, or they may consist of the single piece connecting assembly with clamping/attaching hardware.

The type and style of mechanical reinforcing bar splicers shall be appropriate to the field condition. The Engineer shall determine if mechanical splicers (Item 910.4) shall be used to attach or anchor replacement reinforcing steel. Generally, splicers shall be installed where existing deteriorated reinforcing steel must be replaced, and there is insufficient length of reinforcement remaining to which a typical lap-splice can be made.

Method of Measurement

Item 910.4 will be measured for payment by the unit Each, complete and in place. A unit shall consist of the two-piece, male/female, connected assembly or the single piece connecting assembly, plus all associated hardware necessary to complete the splice or attachment.

Basis of Payment

Item 910.4 will be paid for at the Contract price per unit Each, which price shall include all labor, materials, equipment, and incidentals required to complete the work.

ITEM 961.201**CLEAN (FULL REMOVAL) AND PAINT STEEL
BRIDGE NO. M-18-017(463)****LUMP SUM**

The work done under this item shall conform to the relevant provisions of Subsection 961 of the Standard Specification and the following:

Clean (Full Removal) and Paint bridge including bearings.

Bridge No.: M-18-017(463) Middleboro, Interstate I-495 over State Route 105 and MBTA/MACRR

Area: Superstructure – Structural Steel (including bearing devices)

Surface Preparation: Full Removal

Paint: 3-coat system, full prime, intermediate stripe coat, full intermediate, and finish coat. The finish coat shall be Federal Standard color 14223 Green.

Work under this item includes the surface preparation and painting of all designated steel areas, the bearings, beams, diaphragms, cross frames, drainage systems, and utility supports.

Incidental to this Item is cleaning and removal of any accumulated materials in the areas to be painted and on the beam seats. The Contractor shall clean and remove any accumulated debris in the cast-in drainage troughs and drainage pipes at all substructure elements. The Contractor is responsible for the removal and disposal of the pigeon waste and any other debris accumulated on the steel members and bridge beam seats, drainage troughs and drainpipes.

Existing utilities will remain in place during the painting operations. The contractor will be required to repair at his own expense any damage to these lines due to his operations. Due to the limited space and access for Beam 25 and Beam 26 in Span 2 and Span 2A, the Contractor may use alternate methods for painting including hand tools for cleaning and coating with zinc rich primer as directed in the plans. This work is incidental and is to be completed at no additional cost.

All temporary shielding installed by the Contractor shall be removed by the Contractor at the end of the contract at no additional cost. Existing shielding on the bridge shall be cleaned of debris and secured as a result of the work and remain in place at no additional cost.

Method of Measurement

Item 961.201 will be measured for payment per Subsection 961.80.

Basis of Payment

Item 961.201 will be paid for per Subsection 961.81.

Special Notes Regarding Prevailing Wage Requirements

Note that the erection and dismantling of scaffolding, rigging and containment for bridge painting work is subject to the “Painter(Bridges/Tanks)” prevailing wage rate. This includes surface preparation, including removal of all types of paint on bridges, the application of paint and the clean-up of debris resulting from paint removal operation on bridges, pursuant to the determination by the Massachusetts Department of Labor Standards’ 12/23/2009 ‘Notice Concerning the Removal and Application of Paint on Bridges and Tanks.’”

ITEM 964.21**CONCRETE PROTECTIVE COATING****SQUARE YARD**

Work to be done under this item shall conform to the relevant provisions of Subsection 901 of the standard specifications and shall consist of applying a concrete protective coating to the exposed concrete faces of the pier caps, columns, bridge seats, back walls, breast walls, copings and posts, and/or as required by the Engineer. The underside of the pier caps shall not be coated. Where this item is applied to sidewalks, a suitable grit shall be applied in accordance with the manufacturer's recommendations.

Surface preparation of surfaces to be painted shall be in accordance with manufacturers recommendations utilizing SSPC-SP 13/NACE No. 6 guidelines.

At a minimum: The Contractor shall pressure wash all concrete surfaces to be painted. Pressure washing shall remove all loose, flaking, peeling and non-adherent coating. Surface cleanliness and adhesion of the prepared surface shall be determined and approved by the Engineer prior to the application of the coating system. Coating shall not be applied until surface is dry.

Portable pressure washing equipment shall be operated at a minimum of 3000 psi, a water temperature of 200 degrees F and a minimum consumption of six gallons per minute shall be used to clean all surfaces to be coated. Pressure washers shall be equipped with gauges to ascertain operating pressure and temperature.

Material to be used shall be an acrylic emulsion system such as the following:

- Tnemec: 151-1051 Elasto-Grip FC Primer, and two coats of Enviro-Crete 156 for finish coats.
- Sherwin Williams: Loxon A 24-100 primer and two coats of DTM Acrylic Coating for finish coats.
- Sikagard 552W Primer and Sikagard 550W finish coats (two coats).
- An approved equal

The Contractor shall not order or use materials until approved by the Engineer:

All coating material shall be applied as per the manufacturer's current data sheet.

Method of Measurement

Item 964.21 will be measured for payment by the Square Yard, complete in place.

Basis of Payment

Item 964.21 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, tools, equipment, surface preparation, and incidentals required to complete the work.

ITEM 968.5**WEEPHOLE INSTALLATION****EACH**

The work under this item shall consist of furnishing of all material, products, equipment, and labor for coring and installation of weepholes, as shown on the plans. The length, edge distance, and core

hole diameter shall conform to the minimum dimensions shown on the plans and be placed to avoid interference with the existing reinforcing steel. The method and equipment used to core the holes shall be submitted to the Engineer for approval.

The weep assemblies are to be 4" diameter stainless steel with a geotextile filter comprised of high-tenacity monofilament polypropylene yarns, which are woven into a stable network and able to retain their relative position. The filter shall be removable for future filter maintenance.

All holes shall be diamond core drilled. No impact or percussion type drills will be allowed without prior approval of the Engineer. The holes shall be blown clear of any debris and oil and shall have the approval of the Engineer prior to the placement of any grout material.

If loose cement or concrete spalling is encountered, the Contractor shall perform any necessary repairs before the installation of the weepholes. This repair shall be considered incidental.

The drilling operation shall be performed without damage to any portion of the existing structure that is to remain in place. Any damage to any portion of the existing structure that is to remain in place shall be repaired to a condition equal to or better than that existing prior to the beginning of the Contractor's operations and shall be repaired at the Contractor's expense.

Method of Measurement

Item 968.5 will be measured for payment by the Each weephole cored and installed.

Basis of Payment

Item 968.5 will be paid for at the contract unit price per Each. This price shall include all labor, equipment, materials, cores through the full abutment width and installation of the weep assemblies, additional inspection ports to be cored through the approach slab, flowable fill, and concrete hole patching, weephole assembly, and incidentals required to complete the work.

ITEM 973.2**PRE-COMPRESSED JOINT SEALER****FOOT**

The work under this item shall conform to the relevant provisions of Subsections 971 and 972 of the Standard Specifications, and the following:

The work shall consist of furnishing and installing a continuous pre-compressed seal joint through the roadway, sidewalks, curbs, medians, and parapets at all bridges or as required by the Engineer. The pre-compressed joint sealer shall be installed between adjacent bridge decks as shown on the enclosed sketch and these Special Provisions.

The pre-compressed seal joint sealer shall consist of a preformed (pre-compressed) seal, epoxy adhesive, and injected silicone sealant bands all combined in manner required by the Contract Document.

Material (Pre-Compressed Seal Joint System)

The material of the pre-compressed seal joint sealer shall be capable of accommodating movements of +50%, -50% (100% Total) of nominal material size.

The pre-compressed seal joint system shall be as manufactured by one of the following:

- EMSEAL JOINT SYSTEMS
- LTD (BEJS), Watson Bowman Acme (WABO® FS),
- Schul International Co. (Sealtite 50N),
- An approved equivalent.

The joint system shall be comprised of three components:

1. A cellular polyurethane foam impregnated with hydrophobic 100% acrylic, water-based emulsion, factory-coated with highway-grade, fuel resistant silicone and delivered with written certification from an independent laboratory using differential scanning calorimetry (DSC) and Fourier-transform infrared (FTIR) testing analysis stating that the composition is free of any waxes or wax compounds.
2. A field-applied epoxy adhesive primer.
3. Field-injected silicone sealant bands. Impregnation agent is to have proven non migratory characteristics. Silicone coating shall be highway-grade, low-modulus, fuel resistant silicone applied to the impregnated foam sealant at a width greater than maximum allowable joint extension and which when cured and compressed will form a bellow. Depth and side of seal shall be as recommended by manufacturer for the specific location and may vary along the length of joint. The foam seal shall be installed into manufacturer's standard field-applied epoxy adhesive. The sealant system is to be installed recessed from the surface such that when the field applied injection band of silicone is installed between substrates and the foam-and-silicone-bellow, the highest part of the silicone bellow will be flush with the concrete deck surface.

ITEM 973.2 (Continued)

Changes in plane and direction shall be executed using factory-fabricated “universal 90” or custom transition assemblies supplied by the manufacturer of the pre-compressed seal. Transitions shall be warranted to be watertight at inside and outside corners through the full movement capabilities of the product.

Construction Method (Pre-Compressed Seal Joint Sealer)

The new deck concrete must be cured to reach its design compressive strength prior to installation. The Contractor shall produce uniform and parallel surfaces in the forming within the reinforced concrete deck slabs as detailed on the plans. The joint opening shall be protected by the Contractor to prevent any edge damage by any site equipment throughout the on-going construction process.

Before installing the joint system, the joint opening shall be blown clean using oil-free compressed air. The compressed air shall be free of water and oil. When the pre-compressed joint system is used as the replacement seal for existing armored joint system, the joint opening and surface of the existing armored joint steel angles shall be cleaned and abrasive blasted to meet the requirements of SSPC SP-10 “Near White Metal”. To ensure cleanliness, the joint walls shall be wiped clean with an approved solvent damped lint free rags to the depth of the bottom of the pre-compressed seal material plus 1” to remove any dust remaining. The joint gap shall be inspected for cleanliness by the Engineer. Should any contaminates remain, the joint must be re-cleaned.

The pre-compressed seal, epoxy adhesive, and injected silicone sealant band shall be installed in accordance with the Contract’s drawings. The pre-compressed seal joint system shall be continuous through sidewalks, curbs, medians, and parapets as appropriate to the conditions at hand. Continuity of seal shall be achieved through the use of factory-fabricated universal or custom transitions supplied by the pre-compressed joint seal manufacturer. Due to continuity and traffic concerns the Engineer may require this work to be scheduled at night.

Manufacturer’s Field Representative

The Contractor shall arrange with the pre-compressed seal joint system’s Manufacturer or distributor to have the services of a competent field representative at the work site prior to any installation to instruct the work crews in the proper installation procedures.

The field representative shall remain onsite after work commences and continue to instruct until the Representative, Contractor, and Engineer are satisfied that the crew has mastered the technique of installing the system successfully. As the work progresses the Representative shall make visits to the project, as needed, and shall confer on each visit with the Contractor and Engineer.

The Manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval of the Engineer.

ITEM 973.2 (Continued)

The Contractor shall be completely responsible for the expense of the service of the required field representative and the bid contract price shall be full compensation for all costs in connection therewith.

Water Integrity Test

A water integrity test is required at each joint, as specified in Subsection 972.67.

Method of Measurement

Item 973.2 will be measured per Foot of pre-compressed joint sealer installed, as measured along the joint centerline at the roadway, safety curb, sidewalk, parapet, and median.

Basis of Payment

Item 973.2 will be paid for at the Contract unit price per Foot. This price shall include all labor, material, equipment, manufacturer's representative, and incidentals required to complete the work.

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